

Appendix F

**Placer Ranch Specific Plan
Potable Water Master Plan**

Potable Water Master Plan

May 19, 2017

FINAL

Prepared for
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Community Development Resource Agency
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May 19, 2017

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- Appendix B – InfoWater Water Model Junction and Pipe Output Reports
- Appendix C – University Water Demand Summary
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SECTION 1 – INTRODUCTION

This Placer Ranch Potable Water Master Plan (Master Plan) was prepared by HydroScience Engineers (HydroScience) for MacKay & Somps Civil Engineers, Inc. (MacKay & Somps) in support of the Placer Ranch development. This section summarizes the purpose, background, and scope for this Master Plan.

1.1 Purpose

This document evaluates the methods to convey potable water to Placer Ranch to meet the potable water demand. The purpose of the Master Plan is to:

- Develop a demand summary for potable water customers within Placer Ranch.
- Develop a functional and reliable potable water infrastructure.
- Determine oversizing requirements for pipelines within Placer Ranch to supply demands in the Sunset Industrial Area outside of Placer Ranch

1.2 Background

Placer Ranch is a 2,213± acre project located in unincorporated Placer County and the Sunset Industrial Area, south of the Western Regional Sanitary Landfill (WRSL), east of the Amoruso Ranch Specific Plan, and north of the City of Roseville's city limits. It is expected that the Placer Ranch development will be developed within the jurisdiction of Placer County. A map showing Placer Ranch and the vicinity is provided as **Figure 1-1**.

Placer Ranch is classified as a mixed-use development that includes various land use types including low, medium, and high-density residential housing, commercial areas, light industrial, schools, parks, open space, and satellite campus's for both the California State University, Sacramento and Sierra College. The Placer Ranch property is currently undeveloped rolling grassland and agricultural lands. The area has topographical elevations ranging from 90 to 145 ft., and generally slopes from east to west. The proposed land use plan for Placer Ranch, dated June 24, 2016, is shown in **Figure 1-2**.

Placer County Water Agency supplies water from a large service area extending to the west to Sutter County, south to Sacramento County, north to Yuba County and the Nevada Irrigation District boundary, and east along Interstate 80 to Alta. Depending on the location within PCWA's service area, PCWA either retails treated water, wholesales treated water, or wholesales untreated water within their service area. PCWA receives its water supply primarily from the Middle Fork Project, PG&E, and a CVP contract. Additional supply comes from pre-1914 water appropriations, recycled water, and groundwater.

Placer Ranch is located within the Zone 1 service area of PCWA, which extends from Auburn to Lincoln and south to the Sacramento County line. PCWA operates four water treatment plants, 16 storage tanks, and 496 miles of treated water pipelines within this area. Placer Ranch is a planning sub area within the Lower Zone 1. The primary water supply for Lower Zone 1 is PG&E water from the Drum-Spaulding hydroelectric system. PCWA can also pump

water from the Auburn Tunnel up to its Ophir WTP, which is currently being designed and expanded. From Ophir, water can flow to the PCWA Foothill WTP. From the Foothill WTP, the primary conveyance method from Foothill to Placer Ranch is an existing 42-inch transmission main via English Colony Way and Whitney Ranch Parkway. This transmission main is being extended in phases across Highway 65 as three 24-inch mains. On the west side of Highway 65, these 24-inch mains will manifold back together into the 42-inch main that will serve as the primary Placer Ranch treated water supply.

1.3 Existing Documents

In order to ensure that this Master Plan is coordinated with other planning efforts, previous studies were reviewed and utilized in the planning and design of the potable water system for the Placer Ranch Specific Plan. Each of these studies are summarized below:

Placer County Water Agency (PCWA) 2015 Urban Water Management Plan, adopted June 2, 2016 (UWMP): PCWA prepared the UWMP to comply with the Urban Water Management Planning Act to meet the water supply demands over the next 30 years. This plan provided the water demand factors for new retail customers based on location and land use classification.

Technical Memorandum – Water Supply – Placer Ranch and Phasing of Supply: This technical memorandum summarized the existing infrastructure available to supply potable water to Placer Ranch and identified key factors involved with reprioritizing existing assets to meet the expected build-out demands of Placer Ranch.

Technical Memorandum – Placer Ranch Specific Plan – University Water Demand Estimate: This technical memorandum compared the various methods utilized to estimate the overall water demand for the proposed University to be located on the Placer Ranch Specific Plan. This TM was updated to analyze the Universities projected demand using PCWA water use factors for similar types of land uses. Using this method, the University's projected total, potable, and recycled water demand were recalculated and are shown in **Table 2-3**.

1.4 Report Organization

This report provides a description of the potable water facilities required for the proposed Placer Ranch development. The sections contained in this report are:

- Section 1 – Introduction
- Section 2 – Design Criteria and Water Demands
- Section 3 – Potable Water Conveyance
- Section 4 – Modeling Results and Fire Flow Analysis
- Section 5 – Conclusions
- Section 6 – References
- Appendices

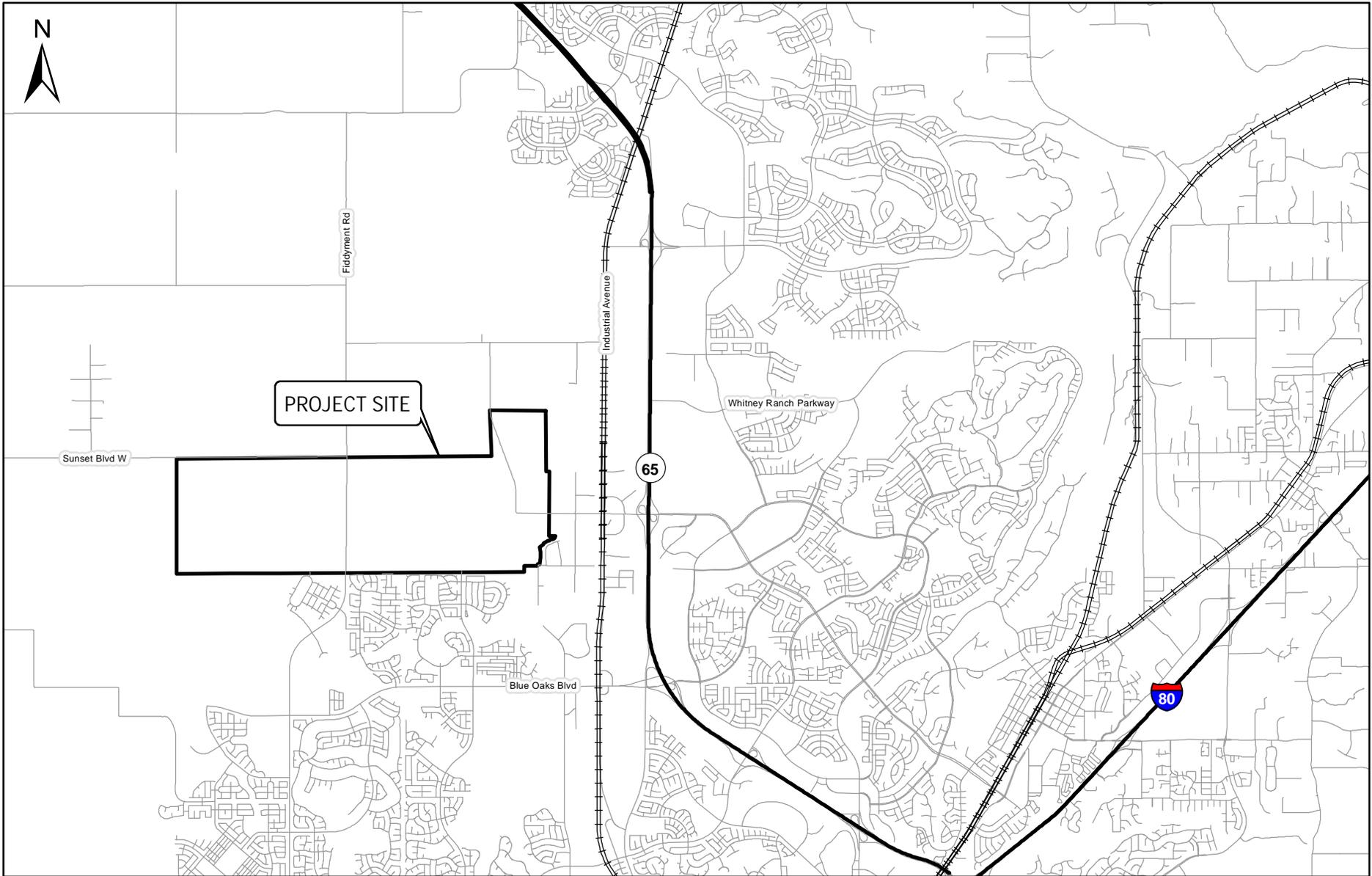


FIGURE 1-1
MACKAY & SOMPS CIVIL ENGINEERS, INC.
PLACER RANCH POTABLE WATER MASTER PLAN
PROJECT LOCATION MAP

LEGEND	
	LDR LOW DENSITY RESIDENTIAL
	MDR MEDIUM DENSITY RESIDENTIAL
	HDR HIGH DENSITY RESIDENTIAL
	GC GENERAL COMMERCIAL
	CMU COMMERCIAL MIXED USE
	CP CAMPUS PARK
	UZ UNIVERSITY
	PF PUBLIC FACILITIES
	PR PARKS & RECREATION
	OS OPEN SPACE PRESERVES
	SITE POTABLE WATER FACILITY LOCATION



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FIGURE 1-2
 MACKAY & SOMPS CIVIL ENGINEERS
 PLACER RANCH POTABLE WATER MASTER PLAN
 PLACER RANCH LAND USE PLAN

SECTION 2 – DESIGN CRITERIA AND WATER DEMANDS

This section presents the planning criteria, modeling criteria, and assumptions used to develop the potable water demands and to size the water distribution infrastructure for Placer Ranch.

2.1 Planning Criteria

The water use factors used in this Master Plan are identified in **Table 2-1**. These water use factors are based on the new retail customer demand factors for the Lower Zone 1 in the PCWA 2015 UWMP, adopted June 2, 2016.

Table 2-1: Potable Water Use Factors

Land Use Designation	Abbreviation	Water Use Factor ¹	Average Day Demand Factor ²
Residential			
Low Density Residential (5 du/ac)	LDR	429 gpd/DU	0.48 AFY/ac
Low Density Residential – Age-Restricted (5.5 du/ac)	LDR-A	429 gpd/DU	0.48 AFY/ac
Medium Density Residential (8 du/ac)	MDR	312 gpd/DU	0.35 AFY/ac
High Density Residential (> 20 du/ac)	HDR	143 gpd/DU	0.16 AFY/ac
Non-Residential			
General Commercial	GC	1,116 gpd/acre	1.25 AFY/ac
Commercial Mixed Use	CMU	1,116 gpd/acre	1.25 AFY/ac
Campus Park	CP	1,482 gpd/acre	1.66 AFY/ac
University (CSU Campus)	UZ	See Appendix C	See Appendix C
Public Facilities (Schools)	P	1,785 gpd/acre	2.00 AFY/ac
Public Facilities (County Facilities)	PF	1,785 gpd/acre	2.00 AFY/ac
Parks and Recreation	PR	1,071 gpd/acre	1.2 AFY/ac
Open Space Preserves	OS	0	0
Placer Parkway	ROW	0	0
Major Roadways & Landscape Corridors	ROW	1,071 gpd/acre	1.20 AFY/ac

Notes:

1. Potable water use factors are converted from the average day demand factor column.
2. Potable water use factors are based on the PCWA 2015 UWMP, adopted June 2, 2016 (2016) Table 4-6.

The potable water demand analysis for Placer Ranch was conducted based upon the water use factors in **Table 2-1** and the June 24, 2016 Placer Ranch land use plan. The land use designation, acreage, number of dwelling units, PCWA standard unit demand factors, and PCWA peaking factors were used to calculate the average day potable water demands. There were two situations where new land uses, the University and Campus Park, required calculation of new water use factors. How these water use factors were developed is described below.

University Water Use Factor(s): Because of the large area and relatively unique land uses associated with the California State University, Sacramento (CSUS) campus, University water demands were analyzed using a combination of typical PCWA water use factors. Interior and exterior irrigation water demands were calculated for each of the University’s individual land uses to develop a total water demand.

Interior water demands for the University land uses were calculated by applying the following PCWA water use factors to similar University land uses as outlined below.

Table 2-2: University Water Use Factors

University Land Use Designation	PCWA Land Class	Water Use Factor ¹	Average Day Demand Factor ²
Academic	Commercial	1,116 gpd/acre	1.25 AFY/ac
Joint Development	Commercial	1,116 gpd/acre	1.25 AFY/ac
Recreation Center	Commercial	1,116 gpd/acre	1.25 AFY/ac
Physical Education	Commercial	1,116 gpd/acre	1.25 AFY/ac
Performing Arts	Commercial	1,116 gpd/acre	1.25 AFY/ac
Dining Hall	Commercial	1,116 gpd/acre	1.25 AFY/ac
Union	Commercial	1,116 gpd/acre	1.25 AFY/ac
Facilities	Commercial	1,116 gpd/acre	1.25 AFY/ac
Library	Commercial	1,116 gpd/acre	1.25 AFY/ac
Student Housing	Multi Family 20.1+ DU/Ac	179 gpd/bed	0.20 AFY/ac
Staff and Faculty Housing	Multi Family 20.1+ DU/Ac	179 gpd/bed	0.20 AFY/ac
Parking Structure ³	-	0	0
Surface Parking ³	-	0	0
Play Fields	Landscape-Greenbelt	1,071 gpd/acre	1.20 AFY/ac
Sierra College Buildings	Commercial	1,116 gpd/acre	1.25 AFY/ac

Notes:

1. Potable water use factors are converted from the average day demand factor column.
2. Potable water use factors are based on the PCWA 2015 UWMP, adopted June 2, 2016 (2016) Table 4-6.
3. Interior water use for parking areas is assumed to be zero. Exterior irrigation is assumed to be done with recycled water.

According to the *Placer Ranch Recycled Water Master Plan* (HydroScience, 2017), irrigation demand based on local evapotranspiration (ET) rates and precipitation rates is approximately 3.24 ft/year, or 2,892 gpd/acre. All exterior irrigation was generally assumed to be 20-40% of the total area for most of the individual land uses, except for the parking structure, surface parking, play fields, and open space preserve. The parking structures and surface parking were assumed to irrigate 15% of the total area. The open space preserve was assumed to have no irrigation demand. The play fields were assumed to have approximately 80% of their acreage irrigated.

The University’s overall water demand is presented in **Table 2-3** and a detailed breakdown of the demand calculations is included in **Appendix C**.

Campus Park Water Use Factor: PCWA does not have an established land use demand factor that is representative of the Campus Park land use type. To calculate water demand projections for the Campus Park parcels, the Campus Park land use type was broken into the component land uses based on a percentage of the total area. These component land use types were associated with the respective PCWA water demand factor and weighted to create a new composite Campus Park water demand factor. Per the June 24, 2016 Placer Ranch Land Use Plan, the percentage of area associated with each land use and the associated water use factor is as follows:

Table 2-3: Campus Park Water Use Factors

Campus Park Land Use	PCWA Land Class	Water Use Factor ¹	Average Day Demand Factor ²
Office (20%)	Commercial	1,116 gpd/acre	1.25 AFY/ac
Research and Development (25%)	Industrial	1,785 gpd/acre	2.00 AFY/ac
Commercial (25%)	Commercial	1,116 gpd/acre	1.25 AFY/ac
Light Industrial (20%)	Industrial	1,785 gpd/acre	2.00 AFY/ac
Warehouse (10%)	Industrial	1,785 gpd/acre	2.00 AFY/ac

Notes:

1. Potable water use factors are converted from the average day demand factor column.
2. Potable water use factors are based on the PCWA 2015 UWMP, adopted June 2, 2016 (2016) Table 4-6.

Applying the individual PCWA water use factors to the percentage of area associated with each type of land use resulted in a weighted average water use factor for the Campus Park land use of 1,482 gpd/acre (1.66 AFY/ac).

Peaking Factors: Average day potable water demands were calculated based on either the number of dwelling units in residential parcels, or the total acreage for that type of land use. Maximum day potable water demands (MDD) were calculated by applying a peaking factor to the Average Day Demands (ADD). A peaking factor of 2.1 was applied to the Placer Ranch average day demands.

The MDD is used to size potable water infrastructure such as tanks and reservoirs to meet operational, and fire flow requirements. There must be adequate storage to convey water to Placer Ranch during fire flow events and when potable water use exceeds the MDD.

The Peak Hour Demand (PHD) represents the highest flow rate Placer Ranch will require at any time throughout the day. This demand is used to size transmission mainlines. Transmission mainlines must be sized to minimize pressure and head loss while maintaining adequate water transport during peak hour conditions. This PHD was calculated by applying a peaking factor of 1.6 to the MDD.

Table 2-4: PCWA Peaking Factors

Demand Type	Peaking Factor
Annual Average Day	1.0
Maximum Day Demand	Annual Average Day x 2.1
Peak Hour Demand	Maximum Day x 1.6

Notes:

1. Per PCWA, peaking factors are based on recent similar development's Master Facilities Agreements.

Table 2-5 summarizes the potable water use for Placer Ranch categorized by land use type. Each land use designation is summarized to show the total acreage it represents, the number of dwelling units located within it, and potable and recycled water demands with and without water conservation measures.

It should be noted that the recycled water demands are calculated differently from potable water demands in that they account for evapotranspiration rates, crop coefficients, etc. Thus, the total project demand does not exactly equal the potable water demand plus the recycled water demand. For more information on how the recycled water demands for the project were calculated, the reader is referred to the *Placer Ranch Recycled Water Master Plan* (HydroScience, 2017).

Table 2-5: Placer Ranch Potable Water Use

Land Use Designation	Abbrev.	Total Area (acres)	Dwelling Units	Water Use Factor (gpd/DU-acre)	Total Demand (AFY)	Potable Demand (AFY) ¹	Potable w/ cons. (AFY) ²	RW Demand (AFY) ^{3,4}	RW w/ cons. (AFY) ^{3,4}
Residential									
Low Density Residential	LDR	407.9	2,039	429	980	980	755	0	0
Low Density Residential - Age-Restricted	LDR-A	131.0	720	429	346	346	267	0	0
Medium Density Residential	MDR	132.3	1,057	312	369	369	285	0	0
High Density Residential	HDR	93.0	2,011	143	322	262	245	60	33
Non-Residential									
General Commercial	GC	25.6	0	1,116	32	20	20	12	6
Commercial Mixed Use	CMU	48.8	0	1,116	61	37	37	24	11
Campus Park	CP	395.5	0	1,482	657	464	464	192	87
University (CSU Campus)	UZ	301.3	0	Varies	1,398	1,154	1,154	244	110
Public Facilities (Schools)	PF	32.0	0	1,785	64	48	48	16	7
Public Facilities (County Facilities)	PF	5.5	0	1,785	11	8	8	3	1
Parks and Recreation	PR	72.6	0	1,071	87	9	9	188	85
Open Space Preserves	OS	250.9	0	0	0	0	0	0	0
Placer Parkway	ROW	158.5	0	0	0	0	0	0	0
Major Roadways & Landscape Corridors	ROW	158.5	0	1,116	29	0	0	77	35
Totals		2,213.3	5,827		4,355	3,698	3,292	816	373

Notes:

1. Demand removes recycled water.
2. Demands include total water demand minus water conservation measures for all water sources, as outlined in the Placer Ranch Water Conservation Plan (HydroScience, 2016).
3. A detailed summary of Recycled Water demand and Recycled Water conservation efforts are elaborated upon in the Placer Ranch Recycled Water Master Plan and Placer Ranch Water Conservation Plan. (HydroScience, 2016).
4. Recycled water demands are calculated as outlined in the DRAFT Placer Ranch Recycled Water Master Plan and differ from the methods employed in the calculation of potable water demands.
5. HDR land uses include 150 units that are a density bonus but not physically assigned to a specific parcel. These units were distributed amongst the Village Center parcels for modeling purposes.
6. Parks and Recreation includes the total acreage for this land use, not the credited acreage.

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Sunset Industrial Area Demands: Future demands for the Sunset Industrial Area were also included in the analysis based on demand calculations provided by PSOMAS. Demands for future SIA buildout that draw water from pipelines within the Placer Ranch project were placed at nodes in the hydraulic model to ensure infrastructure is oversized to sufficiently supply the future SIA demands. The SIA demands and node locations and are as follows:

Node PR-03 – West of Fiddymment Road, 1,591 AFY
Node PR-70 – Fiddymment Road, 1,498 AFY
Node PR-19 – Foothills Boulevard, 1,491 AFY
Node N/A – Campus Park Boulevard at eastern border, 418 AFY
Node N/A – Sunset Boulevard, 438 AFY

It should be noted that Campus Park Blvd and Sunset Blvd SIA demands are outside of the eastern boundary of Placer Ranch and thus do not affect the infrastructure requirements for the project.

Use of recycled water: Recycled water will be utilized as part of the Placer Ranch water supply portfolio. Recycled water will be used to irrigate all landscape areas within Placer Ranch except for landscape irrigation of both low-density residential and medium density residential land uses. Recycled water for landscape irrigation reduces potable water demands.

The use of recycled water has not adjusted the potable water use factors to be consistent with previous land use efforts and to add a factor of safety to the planning of the potable water system infrastructure. It is expected that once the Placer Ranch model is incorporated into the PCWA model, that PCWA will adjust the Placer Ranch water demands to reflect the use of recycled water. Not adjusting the potable water demands to account for recycled water use results in the modeling of potable water demands at a level higher than the projected demand for the Placer Ranch development. Not accounting for recycled water in the sizing of potable water infrastructure also provides a factor of safety that ensures that minor changes in water demands will not generally require upsizing of pipeline infrastructure.

For the purposes of this modeling effort, recycled water accounts for approximately 19% (816 AFY) of the overall Placer Ranch potable demand after the comprehensive recycled water system is adopted as described in the Placer Ranch Recycled Water Master Plan (HydroScience, 2017). If the full water conservation measures described in the Placer Ranch Water Conservation Plan (HydroScience, 2017) are implemented, recycled water would account for 11% (373 AFY) of the total Placer Ranch water demand. Typical conservation methods associated with this water conservation include the reduction of turf and utilization of smart irrigation controllers.

Water conservation: Water conservation measures implemented within the Placer Ranch development can reduce potable water demands and increase the volume of available supply. Proposed conservation efforts vary according to land use designation and new construction BMP's can establish an improved water consumption base line for the proposed development. Typical methods for reducing water consumption include the implementation of turf reduction, drip irrigation systems, re-circulating hot water systems, and smart irrigation controllers. Water conservation values were incorporated into the potable water demand calculations, located in **Table 2-5**, and preliminary approximations indicate that 19.5% (850 AFY) of the projected potable water demand can be eliminated under the proposed

conservation methodologies. However, in order to be conservative, water conservation was not employed in the calculation of water pipeline sizing or water storage.

For additional information about water conservation, the reader is referred to the Placer Ranch Water Conservation Plan (HydroScience, 2017).

2.2 Modeling

The Placer Ranch potable water hydraulic modeling was conducted using InfoWater by Innovyze, Inc. The Placer Ranch hydraulic model was constructed by HydroScience to be a stand-alone model based on the land use plan identified in **Section 1.2**. Potable water demands and fire flow requirements were used to determine the required potable water infrastructure and evaluate the performance of the proposed infrastructure both with and without the future SIA demands.

Placer Ranch includes the proposed construction of a potable water tank and pump station. These facilities were sized to store and transmit potable water within the lower zone of the proposed project, and would be located at the eastern boundary of parcel PR-119 (Placer Parkway Greenbelt) next to Parcel PR-126.

The transmission main infrastructure is intended to follow the major roadway alignments and service all potable water customers based on the potable water demands discussed in **Section 2.1**. Since Placer Ranch will become part of PCWA's Lower Zone, the diurnal flow pattern from PCWA's existing potable water hydraulic model was utilized in the Placer Ranch stand-alone hydraulic model. This flow pattern encompasses the peaking factors used in determining the water demands and simulates potable water usage over the course of three day extended period simulation built into the existing PCWA hydraulic model.

Two on-site wells will be constructed as part of the Placer Ranch project; one on the 0.23-acre parcel PR-93, and one to be co-located on the 2.14-acre parcel PR-98 with the recycled water tank and pump station (**Figure 1-2**). The wells are strategically located with one on the west side of the project, and one on the east side of the project. The well associated with Parcel PR-93 was intended to provide a backup water supply for the potable water distribution system. This backup water supply would be hard plumbed directly into the potable water distribution system and split by a normally closed valve.

The well proposed for Parcel PR-98 was intended to provide a backup water supply for the recycled water distribution system and would be conveyed via an air-gapped connection directly to the recycled water storage tank. Optionally, the PR-98 well could also be plumbed to connect to the potable water distribution system so that this well could provide a backup water supply to both the potable or recycled water distribution systems.

It was assumed that the groundwater wells at Parcels PR-93 and PR-98 would each have a projected capacity of 1.0 MGD, or approximately 695 gpm.

Modeling Criteria: The modeling criteria used to model the potable water distribution system is the standard PCWA distribution system criteria. This criteria is used for all proposed projects within the PCWA’s service area. These criteria include infrastructure, maximum day demands, peak hour demands, velocity, minimum and maximum pressure, and fire flow demand requirements. These criteria are summarized below.

Transmission Main Design Criteria: The sizing of potable water transmission mains requires modeling of water use within Placer Ranch based on projected land uses and the associated potable water demands to meet two essential parameters: pressure and velocity. Pressure in the transmission mains must stay within a set minimum and maximum range, as specified in **Table 2-6**, throughout the three day extended period analysis. A pressure minimum during fire flow events is also required to ensure sufficient flow can be attained at the hydrant while maintaining the required pressure throughout the system. A maximum velocity is required in order to minimize head loss in the transmission mains throughout the system. These criteria are summarized below.

- All pipe velocities must remain below 5 ft/s during the peak hour;
- All pipe velocities during fire flow events must remain below 7 ft/s; and
- Fire flow demands are allocated to each hydrant (junction) within the system based on adjacent land use designation.

Table 2-6: Minimum and Maximum Pressure Constraints

Pressure	Criteria
Minimum Operational Pressures	
Max Day Demand	40 psi
Peak Hour Demand	40 psi
Max Day plus Fire Flow Demand	20 psi
Maximum Operational Pressures	
Static Pressure	130 psi
Individual PRVs required where static pressure is greater than 80 psi	

It should be noted that per PCWA staff direction, the minimum desired operational pressure within Placer Ranch is 60 psi.

Water Storage Criteria: PCWA evaluates storage requirements for their water system on having one full day of water storage at max day demands available within each pressure zone. The on-site potable water storage tank was sized based on the actual max day potable water deliveries after accounting for water conservation and recycled water within the Placer Ranch lower pressure zone. This was calculated by calculating the total water demand within the parcels within this pressure zone, subtracting out demand conserved through potable water conservation, then subtracting out the portion of the remaining demand that would be supplied with recycled water.

Ample storage exists and/or is planned within the PCWA 350 ft pressure zone to provide potable water storage to the portion of Placer Ranch that will reside in the 350 ft pressure zone. Delineation of the pressure zone boundaries, pressure settings and operational control of the pressure zone is discussed in greater detail in **Section 4.1**.

Pressure Zones: Due to the Placer Ranch project bordering the northern boundary of the City, PCWA staff requested that Placer Ranch be separated into its own lower pressure zone to approximately match the HGL of the City potable water distribution system. This will facilitate the ability of PCWA to accept water from the City distribution system during emergency conditions. For operational convenience, the three PRV stations separating the PCWA 350 ft pressure zone from the new lower Placer Ranch pressure zone are located along Foothills Blvd approximately at the intersections of Campus Park Blvd, Sunset Blvd, and Nichols Dr. These PRV station locations are shown in **Figure 3-1**. It should be noted that approximately nine land use areas on the eastern side of Foothills will be located in the PCWA 350 ft pressure zone.

The pressure of the lower PCWA pressure zone was discussed with PCWA staff. The outcome of these discussions resulted in PRV set points at each of the three Placer Ranch PRV stations to be set to maintain a minimum operating pressure of 60 psi in the new lower pressure zone while remaining below PCWA upper pressure limits without the need for a pressure regulator. This resulted in the new Placer Ranch pressure zone having an approximate HGL of 280 ft.

It was also noted that PCWA would like to have ample space for a future pump station located adjacent to the Campus Park Blvd PRV station that would allow water to be pumped by PCWA from the lower pressure zone, around the Campus Park Blvd PRV, and back into the PCWA 350 ft pressure zone. This facility was not separately modeled in this report, since this facility would be primarily a manually operated facility that operates during non-typical conditions.

Fire Flow Criteria: Fire flow demands are allocated to all junctions throughout the development in order to ensure that the designed main transmission infrastructure can sustain the required flow at the hydrant while maintaining the minimum residual pressure throughout the system. The minimum residual pressure to be maintained throughout the distribution system is 35 psi. The minimum pressure required at the node flowing is 20 psi. Fire flow demands are broken down into five major categories. These categories are summarized below:

- Residential: 1,500 gpm
- Multi-Family: 2,500 gpm
- Commercial/Office: 2,500 gpm
- Campus Park: 4,000 gpm
- University/School: 4,000 gpm

The residential, multi-family, and Commercial/Office fire requirements are based on typical requirements associated with these types of land uses in the California Fire Code. For the Campus Park and University/School land uses, which have a blending of land uses, it was

assumed that the maximum fire flow associated with the Campus Park and University component land use types be applied to the whole area. Thus, the fire flow for these land uses was assumed to be 4,000 gpm (equivalent to 8,000 gpm, reduced by 50% assuming sprinklers are used) over 4 hours.

Additionally, PCWA also has maximum velocity criteria during fire flow. During peak demand periods, pipeline velocities are not to exceed 7 ft/s.

2.3 Summary of Assumptions

There are a number of assumptions associated with the Placer Ranch potable water modeling. These assumptions include:

- Pipeline diameters for new pipelines are limited to standard sizes such as 12, 18, 24-inches, etc.;
- All future pipes have a Hazen-Williams roughness coefficient consistent with PVC with a C value equal to 130;
- The peaking factor for MDD is 2.1 of the ADD and the peaking factor for PHD is 3.4 of the ADD, or 1.6 times the MDD ($2.1 \times 1.6 = 3.4$);
- The minimum pressure allowed in the Placer Ranch potable water distribution system is 60 psi during MDD at the lowest pressure node, and 20 psi during fire flow events at the flowing node;
- Placer Ranch will maximize use of recycled water for irrigation purposes. However, the Placer Ranch potable water distribution system is to be sized to convey potable water to all land uses for all purposes in the event that recycled water is not available;
- System inerties will provide adequate capacity and pressure to convey water to Placer Ranch at low flow conditions;
- Storage facility size is based on the criteria listed in **Section 2.2**;
- All potable water infrastructure, including the storage tank, pump station, and distribution system, was sized assuming that there was no use of recycled water and no utilization of water conservation. This provides a factor of safety into the planning of this infrastructure.
- Per conversations with PCWA staff, all tie-ins to the PCWA 350 ft pressure zone were modeled as fixed head reservoirs at 300 ft. This lower HGL was selected based on the PCWA input, what pressures PCWA has seen in the field and estimated for the zone at buildout, and to account for head losses associated with water conveyance. The subsequent PRV station set points are as specified in **Table 4-1**;
- The fire flow requirements associated with the California Fire Code were modeled based on the land use adjacent to each node. For land uses without specific fire flow requirements in the California Fire Code, the highest fire flow requirement within that land use was used.
- The maximum pipeline velocity was assumed to be 5 ft/s for normal operation, and 7 ft/s during fire flow conditions.

- The 42-inch main transmission pipeline upstream of the on-site Placer Ranch water storage tank was proposed to be located within Placer Ranch in Campus Park Blvd. This main was oversized to serve both Placer Ranch and the water transmission needs of PCWA. If water transmission for PCWA was not required for this main, this main would instead be 18-inches in diameter;
- Per the water demand calculations provided by PSOMAS, 4,581 AFY of demand for the future SIA buildout was placed on the northern boundary of the project at Foothills Blvd, Fiddymont Road and west of Fiddymont Road (1,491, 1,498 and 1,591 AFY respectively). This demand was placed as an MDD demand and the standard PCWA Lower Zone diurnal pattern was applied; and
- Per PCWA direction, 15 MGD of demand was placed as a point demand at the end of the 36-inch main transmission pipeline where it leaves the Placer Ranch project. This demand is to simulate future development/water transmission needs of PCWA to the west of the Project. This demand was placed as an ADD demand without a diurnal pattern to simulate a constant flow of 15 MGD to the west.

SECTION 3 – POTABLE WATER CONVEYANCE

This section provides information on the potable water conveyance, how it will be supplied to Placer Ranch, and how it will be distributed within Placer Ranch.

3.1 Transmission Main

The transmission mainline infrastructure is designed to be a looped system with interties between Placer Ranch and the existing and proposed PCWA transmission and distribution system. The main transmission backbone is a 42-inch pipe that runs east to west through Placer Ranch within Campus Park Blvd. This 42-inch pipe downsizes to 36-inches at the potable water tank site west of Fiddymment Rd. Additional 18-inch pipelines travel east west through the property along Sunset Blvd and College Park Dr. The two main north south alignments are 18-inches located in Fiddymment Rd and Foothills Blvd respectively. The pipeline in Foothills Blvd north of Placer Parkway was upsized to 24-inch to provide water supply to the SIA. The University is bordered with a minimum of 18-inch mainlines on all sides. Multiple laterals from the main loop alignments extend along roadways to serve customers outside of the primary loops, these pipelines are mainly 12-inch. The pipeline in Sunset Blvd. east of “A” Street was upsized to an 18-inch pipe to serve the planned well. See **Figure 4-1** for a map showing the backbone infrastructure for the Placer Ranch potable water distribution system.

As part of the Placer Ranch project, the PCWA backbone transmission main in Whitney Ranch Parkway will be extended to the tank site west of Fiddymment Road as a 42-inch transmission main from the eastern boundary of Placer Ranch. Downstream of the tank site, this transmission main will continue west as a 36-inch transmission main (42-inch with SIA demands) within Campus Park Blvd, extending west to the Placer Ranch boundary at Placer Parkway to provide at least 15 MGD of conveyance capacity to future developments to the west and south. The on-site transmission main will provide transmission capacity for PCWA regional facilities, future SIA development, and for transmission of potable water to Placer Ranch. Construction of the Placer Ranch distribution system will generally coincide with the Placer Ranch Phasing Plan (see **Appendix D**), but may require advance construction of select infrastructure elements.

Table **3-1** provides quantity takeoffs for the backbone infrastructure required for the Placer Ranch potable water distribution system. It should be noted that additional distribution system pipelines above and beyond the lengths shown in this backbone infrastructure will be required within or adjacent to each land use area as the plans for those areas are defined.

Table 3-1: Placer Ranch Backbone Water Distribution Pipeline Quantity Takeoffs

Pipeline Diameter	Length of Pipe to Service Placer Ranch + SIA ¹	Length of Pipe to Serve Placer Ranch Only ¹
12-inch	19,000	19,400
18-inch	13,900	14,200
24-inch	700	0
36-inch	0	1,800
42-inch	7,800	6,000
Total LF	41,500	41,500

Notes:

1. Pipeline total lengths were rounded up to the nearest 100 ft.

3.2 System Interties

Placer Ranch will connect into the PCWA’s existing 350 ft pressure zone to receive potable water. The PCWA distribution system/350 ft pressure zone will convey water to Placer Ranch through three system interties. These interties are listed below and shown on **Figure 3-1**.

- One intertie with the planned 42-inch main in Placer Parkway;
- One intertie to the existing 16-inch pipeline in Sunset Blvd; and
- One intertie to the existing 16-inch pipeline in Nichols Rd.

3.3 Water Reliability and Emergency Interties

The Placer Ranch project will have three planned water reliability and emergency interties to the City. Each connection is to have a bidirectional meter, isolation valves, and telemetry to both PCWA and Roseville. Each intertie is listed below and shown on **Figure 3-1**.

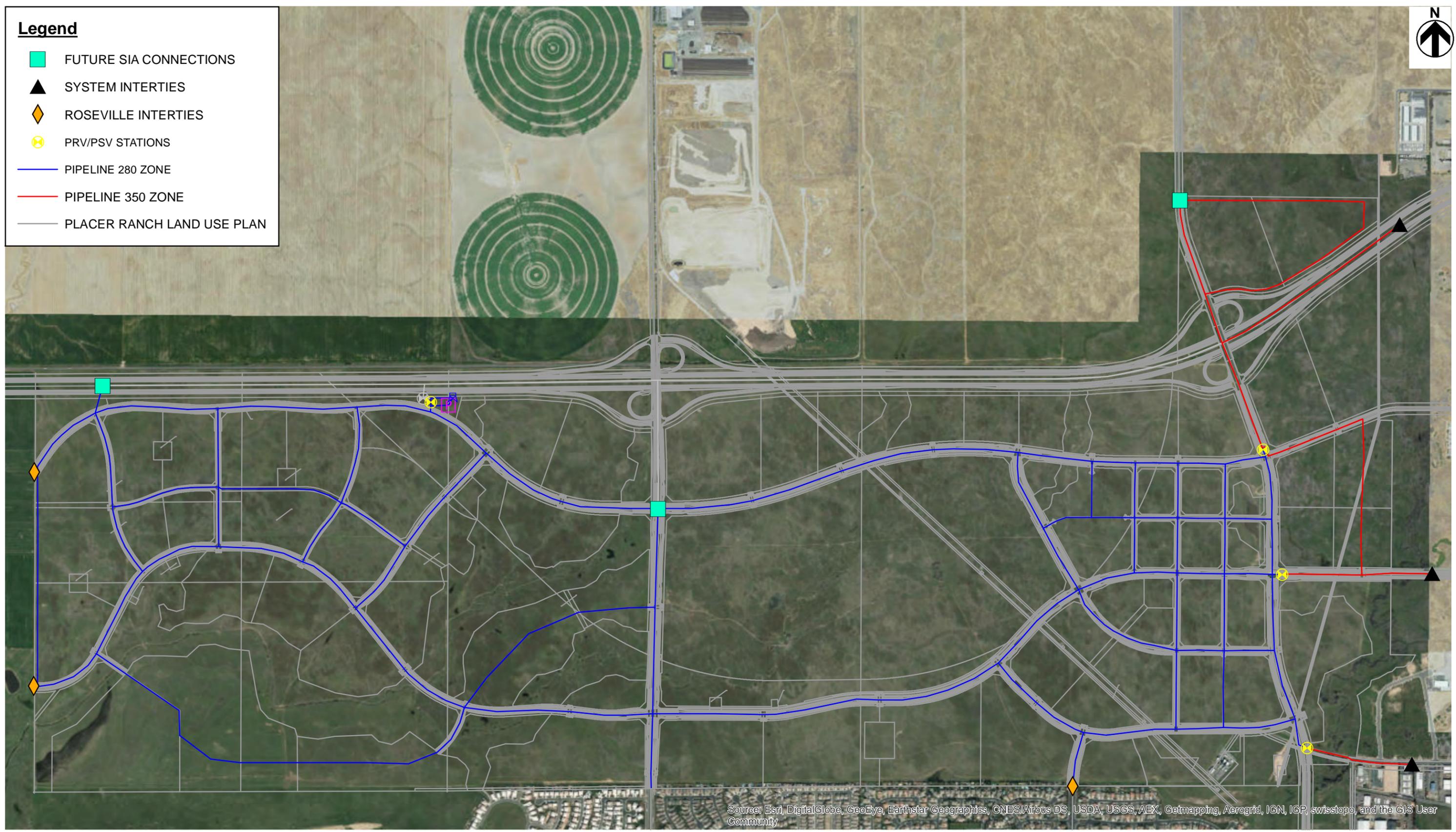
- 12-inch connection at Woodcreek Oaks Blvd to the existing City potable water distribution system
- 12-inch connection at Campus Park Drive to the future Amoruso Ranch
- 12-inch connection at Sunset Blvd to the future Amoruso Ranch

3.4 Water Storage

Placer Ranch west of Foothills Road will reside within a new pressure zone. This new pressure zone will require the construction of a new on-site storage tank and pump station next to Parcel PR-126 to provide potable water system reliability. Based on the land uses within the limits of the project and within the new pressure zone, as well as the MDD demands associated with those land uses, HydroScience calculated the storage volume required for the project within the new pressure zone. The total storage required for new pressure zone is 5.16 MG tank. Potential dimensions for a tank with this volume would result in a storage tank with a diameter of 150 ft and a sidewall height of 40 ft. A preliminary site plan showing the water storage and pumping facilities is provided as **Figure 3-2**. It should be noted that

Legend

- FUTURE SIA CONNECTIONS
- ▲ SYSTEM INTERTIES
- ◆ ROSEVILLE INTERTIES
- ⊗ PRV/PSV STATIONS
- PIPELINE 280 ZONE
- PIPELINE 350 ZONE
- PLACER RANCH LAND USE PLAN

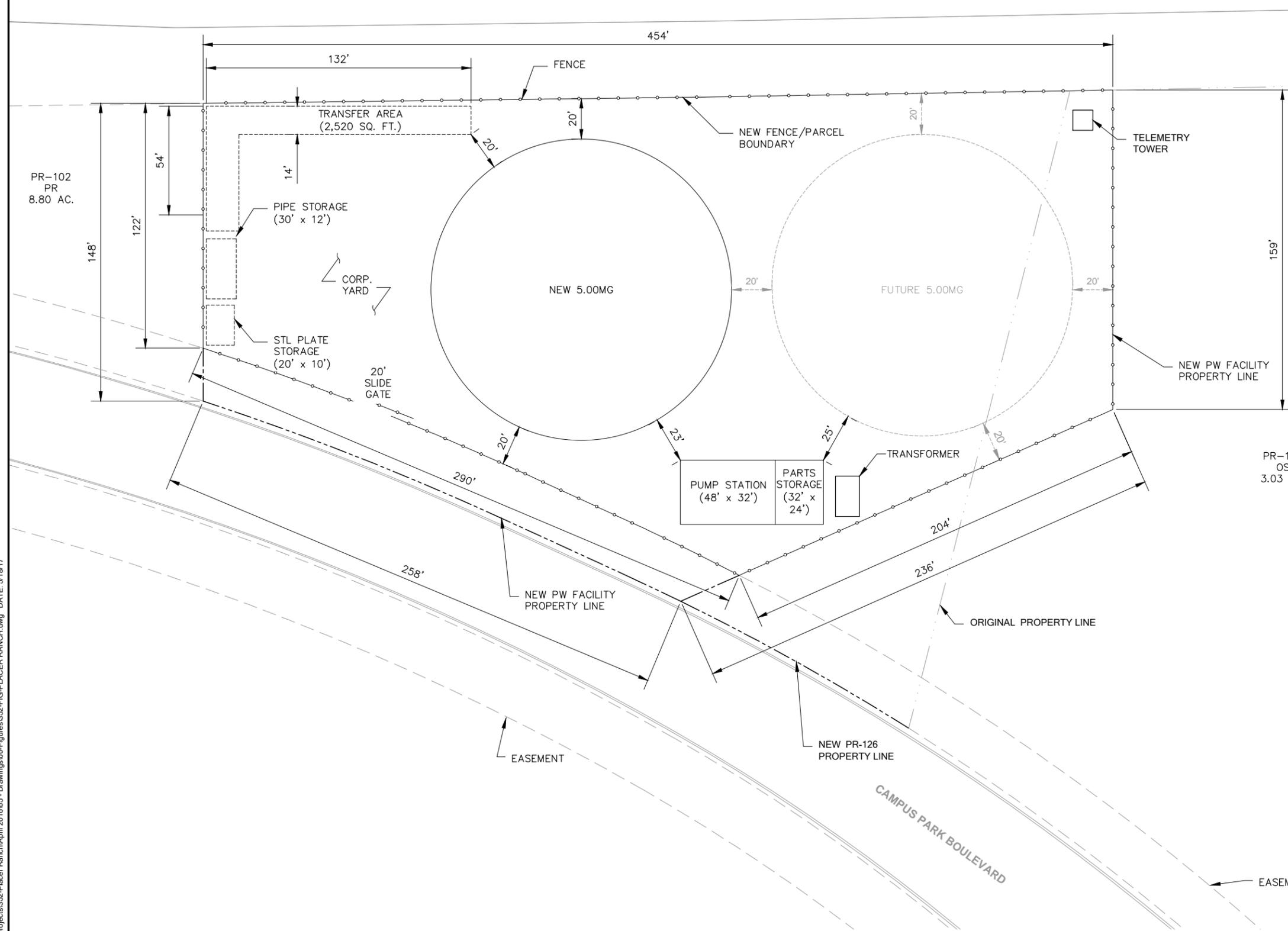


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

FIGURE 3-1
MACKAY AND SOMPS CIVIL ENGINEERS
PLACER RANCH POTABLE WATER MASTER PLAN
SYSTEM INTERTIE AND PRV STATION LOCATIONS



FUTURE PLACER PARKWAY



NOTES

1. THE AREA OF THE POTABLE WATER FACILITY IS APPROXIMATELY 2.09 ACRES. ACREAGE INCLUDES AREA BETWEEN SOUTH FENCE AND PROPERTY EASEMENT.
2. AREA WEST OF POTABLE WATER FACILITY PR-102 PARCEL IS 8.80 ACRES.
3. ADJUSTED PR-126 PARCEL IS 3.03 ACRES, ACREAGE REMAINS THE SAME.
4. ONLY MAJOR ABOVEGROUND FEATURES ARE SHOWN ON THIS CONCEPTUAL SITE PLAN. THE INTENT IS TO SHOW HOW THE FACILITIES WOULD FIT WITHIN THE PROJECT SITE.

\\hsa-vim-dc1\vol1\common\projects\352-Placer_Ranch\April_2016\05 - Drawings\00-Figures\352-FIG-PLACER RANCH.dwg DATE: 5/18/17



FIGURE 3-2
 MACKAY & SOMPS CIVIL ENGINEERS
 PLACER RANCH POTABLE WATER MASTER PLAN
 POTABLE WATER FACILITY - PRELIMINARY SITE PLAN

the preliminary design for the tank and pump station site allows for the potential expansion of the site to co-locate an additional storage tank to accommodate future PCWA projects (SIA, Regional University, Placer Vineyards, etc.).

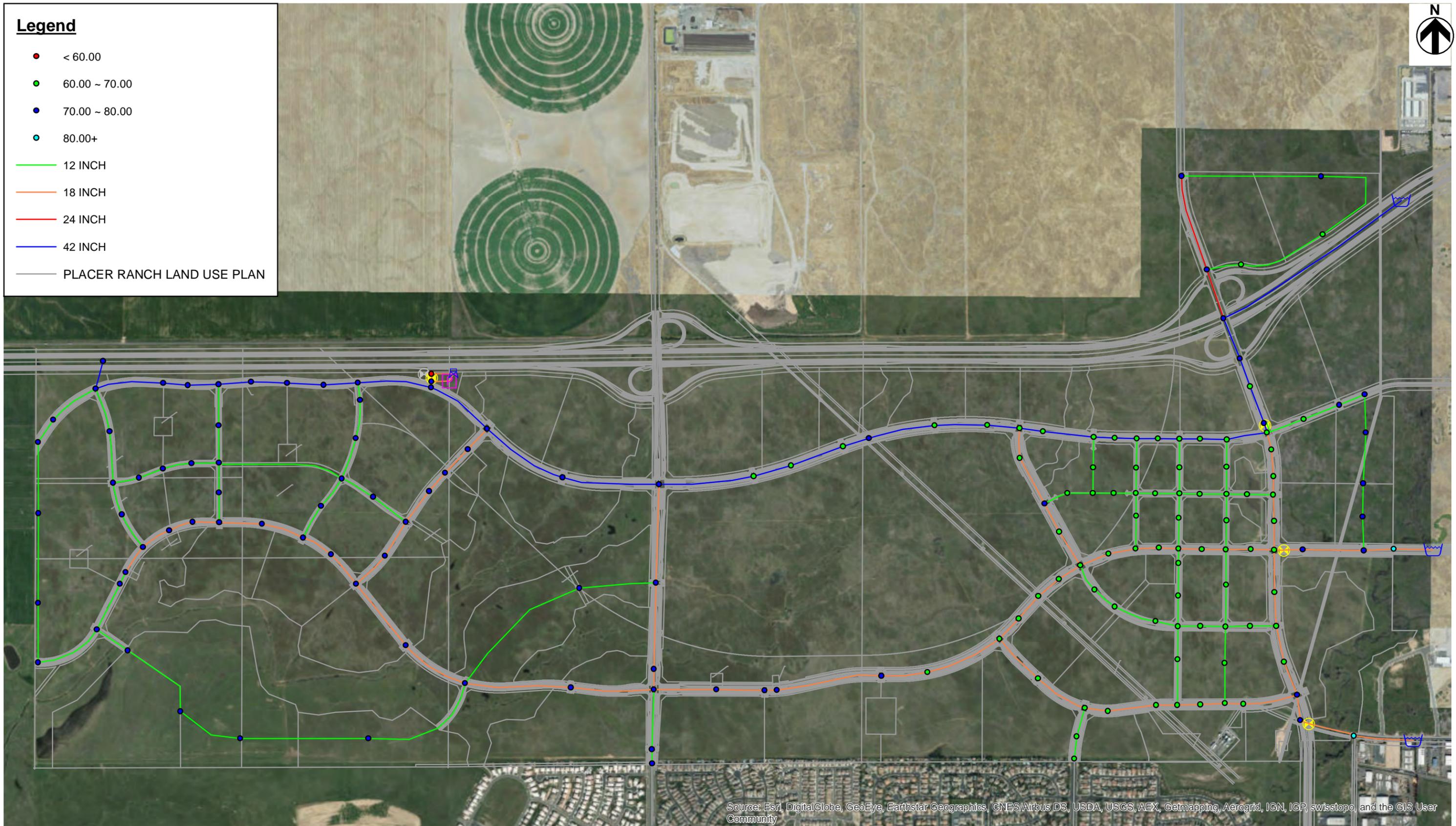
It was assumed that the new storage tank would be located at grade. A geotechnical investigation should be performed to confirm that the proposed site is suitable to locate a water storage tank and the soil and foundation requirements for this tank. At this volume, either a pre-stressed concrete tank or a welded steel tank is feasible, though it is understood that PCWA's preferred storage tank material is pre-stressed concrete.

Ample storage is existing or proposed in the PCWA 350 ft pressure zone. As a result, no additional storage was required for the additional Placer Ranch water demands in this area. Pumping requirements for the booster pump station pumping out of this tank is further discussed in **Section 4.1**.

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Legend

- < 60.00
- 60.00 ~ 70.00
- 70.00 ~ 80.00
- 80.00+
- 12 INCH
- 18 INCH
- 24 INCH
- 42 INCH
- PLACER RANCH LAND USE PLAN



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

FIGURE 4-1
MACKAY AND SOMPS CIVIL ENGINEERS
PLACER RANCH POTABLE WATER MASTER PLAN
POTABLE WATER DISTRIBUTION SYSTEM

Legend

- FIRE FLOW EXCEEDS 7ft/s
- HYDRANTS/JUNCTIONS
- PIPELINES
- PLACER RANCH LAND USE PLAN

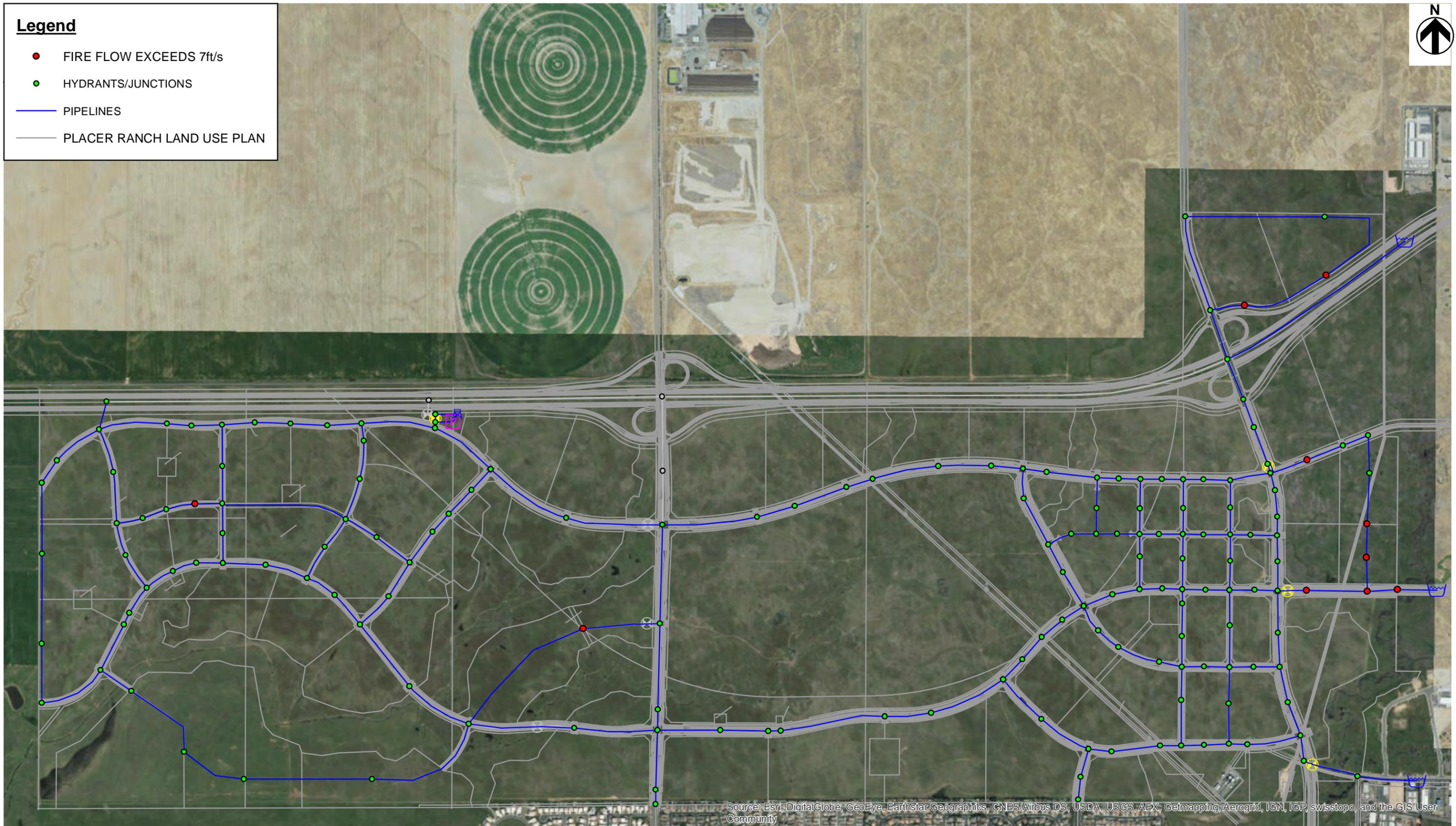


FIGURE 4-2
MACKAY AND SOMPS CIVIL ENGINEERS
PLACER RANCH POTABLE WATER MASTER PLAN
DRAFT - HYDRANTS FAILING FIRE FLOW VELOCITY CRITERIA

SECTION 4 – MODELING RESULTS AND FIRE FLOW ANALYSIS

This section summarizes the results of modeling for the Placer Ranch potable water distribution system.

4.1 Modeling Results

An extended period analysis was run on the stand-alone Placer Ranch potable water distribution system. A summary of these results is provided below.

Distribution infrastructure: The mainline infrastructure for the Placer Ranch development was calibrated and optimized to meet all of the development's calculated demand requirements, including the 15 MGD to the west and future SIA demands. These requirements are the calculated MDD, PHD, and MDD plus Fire Flow demands. The infrastructure identified in **Figure 4-1** maintains pressure and velocity requirements for the full duration of the extended period analysis.

InfoWater provides full output reports for all elements in the network at the conclusion of each successful run of the model. This ensures that pressure and velocity requirements are maintained during the entire analysis at all critical points. A full set of these reports for the stand-alone Placer Ranch hydraulic modeling effort can be found in **Appendix B**.

Tank Pump Station: Due to the oversizing of the 42-inch transmission main, as well as the 300 ft HGL (minimum) supplied by the PCWA 350 ft zone, pressure within new Placer Ranch pressure zone during normal operating conditions varies by approximately +/-2 psi. These conditions do not require the pump station to operate. Per PCWA recommendations, the pump station shall be designed to account for the highest fire flow within the development, while allowing for future expansion to serve all future developments in the Sunset Area. This requires an initial capacity of 4,500 gpm plus a factor of safety. As shown on **Figure 3-2**, the preliminary site plan for the tank and pump station allows for the expansion of the pump station and the addition of a second storage tank to serve SIA and other future development demands.

PRV Stations: Due to the extension of the PCWA 350 ft pressure zone to Placer Ranch, PRV stations are required to lower the HGL of the new lower pressure zone so that the HGL of the lower zone is comparable to the adjacent City of Roseville distribution system, at approximately 280ft.

Per PCWA staff direction, the Placer Ranch PRV's were set such that a minimum 60 psi is maintained at the lowest pressure node within Placer Ranch. Due to the natural elevation of the project site, pressure increases in the system as water travels east to west and north to south. Therefore, the PRV station setting for the northeast PRV station (intersection of Foothills Blvd and Campus Park Blvd) is set to approximately the minimum pressure required. **Table 4-1** lists the PRV stations, pipeline size, and settings.

Table 4-1: PRV Station Settings

PRV Station ¹	Pipeline Diameter ²	Setting (psi)
Campus Park Blvd	42-inch	62.0
Sunset Blvd	16-inch	65.0
Nichols Dr	16-inch	73.0

Notes:

1. All PRV Station are located along Foothills Blvd, the street listed is the cross street.
2. Each PRV station is modeled as a single large PRV. It is assumed that during detailed design this will be re-evaluated to provide for the potential of multiple smaller PRV's.

4.2 Fire Flow Analysis

A full fire flow analysis was conducted to verify adequate flow could be sustained at all junctions (hydrants) throughout Placer Ranch. Fire flow demands were allocated to each junction within Pacer Ranch based on the adjacent land use with the highest potential fire flow demand, and the criteria listed in **Section 2.2**. Additionally, the fire flow analysis was run during the peak demand period and low flow condition in order to simulate the most limiting conditions. Additionally, per PCWA standards, a maximum of 7 ft/s velocity was implemented on all pipelines.

The modeling for the Placer Ranch distribution system showed that ample flow is available at all but 10 fire flow junctions while limiting velocities in all pipelines to less than 7 ft/s. All junctions have ample pressure above the minimum required flow pressure of 20 psi at the hydrant. **Table 4-2** lists the hydrants that fail the fire flow criteria due to pipeline velocity and their location. **Figure 4-2** shows the locations of the hydrants failing the fire flow velocity criteria.

Table 4-2: Fire Flow Hydrants Failing Criteria

Hydrant ID	Street - Parcel Served	Fire Flow + MDD (gpm)	Available Flow (gpm)	Flow Deficit (gpm)
PR-26	Sunset Blvd – PR-89	4,004	2,844	1,160
PR-91	Sunset Blvd – PR-89	4,000	2,896	1,104
PR-22	Foothills Blvd – PR-82	4,047	3,033	1,014
PR-92	Sunset Blvd – PR-89	4,051	3,210	841
PR-154	Un-named Rd – PR-91	4,504	3,739	765
PR-90	Sunset Blvd – PR-89	4,000	3,459	551
PR-93	Sunset Blvd – PR-88	4,027	3,532	495
PR-86	Campus Park Blvd, PR-86	4,073	3,805	269
PR-57	Paseo 115 – PR-70	4,110	4,027	83
PR-21	Foothills Blvd – PR-83	4,046	4,014	32

It should be noted that all 10 junctions that fail the fire flow criteria due so based on pipeline velocity, are within approximately 1,000 gpm of the required fire flow, and other hydrants bordering the same property meet the fire flow requirements. Rather than upsize a pipeline strictly to allow for a nominal additional amount of fire flow to be achieved while maintaining

7 ft/s, it is assumed that velocities in these situations would be mitigated by one or more of the following methods:

- Addition of distribution pipeline looping within each parcel
- Splitting fire flow demands over multiple hydrants, or
- Allowing for a slightly elevated pipeline velocity in select areas in lieu of oversizing the pipelines and inducing an unnecessary water age issue.

It should be further noted that each of these junctions has an assumed fire flow requirement equivalent to the maximum required by the California Fire Code.

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SECTION 5 – CONCLUSIONS

Conclusions from this potable water master plan are listed below.

- Placer Ranch will be located within two PCWA pressure zones – the first is an extension of the PCWA 350 ft pressure zone, and the second will be designed to have a pressure similar to the City of Roseville Zone 4 at an approximate HGL of 280 ft. PRVs will connect the PCWA 350 ft pressure zone and the Placer Ranch (280 ft) pressure zone.
- PCWA has requested ample space for a future pump station that would pump water from the Placer Ranch (280 ft) pressure zone back into the PCWA 350 ft pressure zone at the PRV located near the intersection of Foothills Boulevard and Campus Park Boulevard.
- It is expected that the PCWA 42-inch transmission main will provide the main source of supply to Placer Ranch. This transmission pipeline will provide transmission capacity for flows to Placer Ranch, other portions of the Sunset Industrial Area, and 15 MGD of excess capacity for PCWA to convey west and south.
- Of the total Placer Ranch potable water demand of 3,698 AFY (3,292 AFY with water conservation), the 42-inch transmission main on Campus Park Boulevard will supply approximately 79.9% of that demand under this modeled scenario. This is equivalent to supplying 2,953 AFY (2,630 AFY with water conservation). This 42-inch transmission main will also provide 4,581 AFY of potable water to other portions of the SIA, and 15 MGD (16,803 AFY) to other PCWA service areas to the west and south. This transmission pipeline is expected to be cost shared amongst multiple parties based on the required flow in the pipeline.
- The pipelines on Foothills Boulevard north of the PCWA turnout and Fiddymont Rd north of the PCWA turnout will be oversized for the benefit of other portions of the SIA.
- Initial phases of Placer Ranch can be connected to two existing 16-inch PCWA pipelines in the Sunset Industrial Area located on Nichols Drive and Sunset Blvd.
- A 5.16 MG storage tank and pump station will provide system reliability for the Placer Ranch (280 ft) pressure zone. It is expected that PCWA will finance the tank and pump station through connection charges to customers in the zone.
- Three water reliability and emergency interties between PCWA and the City of Roseville will be located within the Placer Ranch distribution system.
- A telemetry study should be performed to determine necessary infrastructure to connect all new infrastructure into PCWA existing SCADA Network system; the nearest existing PCWA SCADA tower is located near the Sunset Water Treatment Plant.

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SECTION 6 – REFERENCES

1. HydroScience Engineers, Technical Memorandum 1; *Placer Ranch Specific Plan University Water Demand Estimate*; February 11, 2015.
2. HydroScience Engineers, *Placer Ranch DRAFT Recycled Water Master Plan*, May 2017.
3. HydroScience Engineers, *Placer Ranch DRAFT Water Conservation Plan*, May 2017.
4. MacKay & Soms Civil Engineers, Inc., *Placer Ranch Land Use Plan DRAFT*, June 24, 2016.
5. MacKay & Soms Civil Engineers, Inc., *Placer Ranch Sunset Industrial Area General Plan Land Use*, March 2015.
6. Municipal Consulting Group, Technical Memorandum 1; *Water Supply - Placer Ranch and Phasing of Supply*, March 30, 2015.
7. Placer County Water Agency, *2015 Urban Water Management Plan*, June 2016.
8. West Yost Associates, *City of Roseville - Critical Dry Year Water Supply and Infrastructure Needs Assessment*, May 14, 2015.
9. West Yost Associates, Technical memorandum 1; *Transmittal of Final PCWA Lower Zone 1 Hydraulic Model*, June 30, 2016.

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APPENDIX A

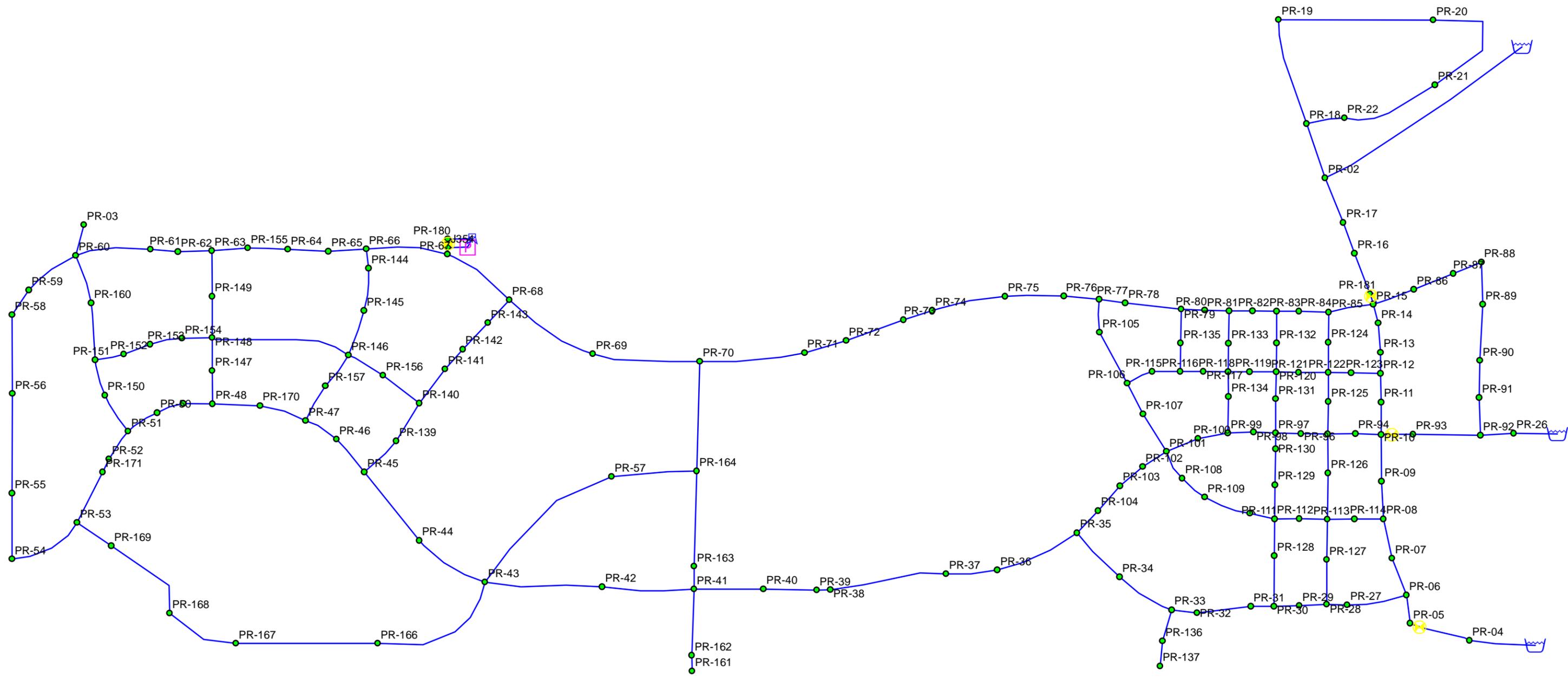
Placer Ranch Detailed Potable Water Demand Summary

Placer Ranch

No.	ID	Land Use	Total Area (Acres)	Dwelling Units (du)	Density (du/ac)	Water Demand Factor (afy/acre)	Land Class	Water Demand Factor (gpd/acre)	Average Day Demand (24 Hours) (GPD)	Average Day Demand w/o RW (gpm)	Average Day Demand (gpm)	Average Annual Demand w/o RW (AFY)	Average Annual Demand (AFY)	Max Day Demand (gpm)	Peak Day Demand (gpm)	Peak Hour Demand (gpm)	Potable Water with Water Conservation	
																	Water Conservation Factor	Reduced Demand with Water Conservation
																	% reduction	(AFY)
1	PR-01	LDR	21.12	106	5	0.48	8679	429	45,474	31.58	31.58	50.94	50.94	66.32	106.11	106.11	23%	39.2
2	PR-02	LDR	26.32	132	5	0.48	8686	429	56,628	39.33	39.33	63.43	63.43	82.58	132.13	132.13	23%	48.9
3	PR-03	LDR	16.03	80	5	0.48	8728	429	34,320	23.83	23.83	38.44	38.44	50.05	80.08	80.08	23%	29.6
4	PR-04	LDR	13.93	70	5	0.48	8668	429	30,030	20.85	20.85	33.64	33.64	43.79	70.07	70.07	23%	25.9
5	PR-05	LDR	18.01	90	5	0.48	8717	429	38,610	26.81	26.81	43.25	43.25	56.31	90.09	90.09	23%	33.3
6	PR-06	LDR	18.38	92	5	0.48	8703	429	39,468	27.41	27.41	44.21	44.21	57.56	92.09	92.09	23%	34.1
7	PR-07	LDR	21.36	107	5	0.48	8696	429	45,903	31.88	31.88	51.42	51.42	66.94	107.11	107.11	23%	39.6
8	PR-08	LDR	17.64	88	5	0.48	8732	429	37,752	26.22	26.22	42.29	42.29	55.06	88.09	88.09	23%	32.6
9	PR-09	LDR	20.7	104	5	0.48	8670	429	44,616	30.98	30.98	49.98	49.98	65.07	104.10	104.10	23%	38.5
10	PR-10	LDR	19.83	99	5	0.48	8725	429	42,471	29.49	29.49	47.57	47.57	61.94	99.10	99.10	23%	36.6
11	PR-11	LDR	20.47	102	5	0.48	8742	429	43,758	30.39	30.39	49.02	49.02	63.81	102.10	102.10	23%	37.8
12	PR-15	LDR	32.65	163	5	0.48	8725	429	69,927	48.56	48.56	78.33	78.33	101.98	163.16	163.16	23%	60.3
13	PR-16	LDR	36.75	184	5	0.48	8700	429	78,936	54.82	54.82	88.42	88.42	115.12	184.18	184.18	23%	68.1
14	PR-17	LDR	26.29	131	5	0.48	8742	429	56,199	39.03	39.03	62.95	62.95	81.96	131.13	131.13	23%	48.5
15	PR-18	LDR	29.98	150	5	0.48	8706	429	64,350	44.69	44.69	72.08	72.08	93.84	150.15	150.15	23%	55.5
16	PR-19	LDR	30.49	152	5	0.48	8738	429	65,208	45.28	45.28	73.04	73.04	95.10	152.15	152.15	23%	56.3
17	PR-20	LDR	27.87	139	5	0.48	8734	429	59,631	41.41	41.41	66.80	66.80	86.96	139.14	139.14	23%	51.5
18	PR-21	LDR	10.04	50	5	0.48	8747	429	21,450	14.90	14.90	24.03	24.03	31.28	50.05	50.05	23%	18.5
19	PR-12	LDR	42.58	234	5.5	0.48	7926	429	100,386	69.71	69.71	112.45	112.45	146.40	234.23	234.23	23%	86.6
20	PR-13	LDR	57.49	316	5.5	0.48	7925	429	135,564	94.14	94.14	151.85	151.85	197.70	316.32	316.32	23%	117.0
21	PR-14	LDR	30.95	170	5.5	0.48	7930	429	72,930	50.65	50.65	81.69	81.69	106.36	170.17	170.17	23%	62.9
22	PR-31	MDR	17.9	143	8	0.35	5453	312	44,616	30.98	30.98	49.98	49.98	65.07	104.10	104.10	23%	38.5
23	PR-32	MDR	18.68	149	8	0.35	5461	312	46,488	32.28	32.28	52.07	52.07	67.80	108.47	108.47	23%	40.1
24	PR-33	MDR	7.88	63	8	0.35	5448	312	19,656	13.65	13.65	22.02	22.02	28.67	45.86	45.86	23%	17.0
25	PR-34	MDR	11.48	92	8	0.35	5436	312	28,704	19.93	19.93	32.15	32.15	41.86	66.98	66.98	23%	24.8
26	PR-35	MDR	9.74	78	8	0.35	5439	312	24,336	16.90	16.90	27.26	27.26	35.49	56.78	56.78	23%	21.0
27	PR-36	MDR	15.18	121	8	0.35	5465	312	37,752	26.22	26.22	42.29	42.29	55.06	88.09	88.09	23%	32.6
28	PR-37	MDR	11.33	91	8	0.35	5423	312	28,392	19.72	19.72	31.80	31.80	41.41	66.25	66.25	23%	24.5
29	PR-38	MDR	12.92	103	8	0.35	5464	312	32,136	22.32	22.32	36.00	36.00	46.87	74.98	74.98	23%	27.8
30	PR-39	MDR	27.17	217	8	0.35	5454	312	67,704	47.02	47.02	75.84	75.84	98.74	157.98	157.98	23%	58.5
31	PR-41	HDR	8.16	163	20	0.16	2181	143	23,309	12.91	16.19	20.82	26.11	33.99	54.39	54.39	6%	19.5
32	PR-42	HDR	10.23	205	20	0.16	2174	143	29,315	16.25	20.36	26.21	32.84	42.75	68.40	68.40	6%	24.5
33	PR-43	HDR	7.19	161	20	0.16	1945	143	23,023	13.10	15.99	21.13	25.79	33.58	53.72	53.72	6%	19.8
34	PR-44	HDR	7.9	175	20	0.16	1966	143	25,025	14.20	17.38	22.91	28.03	36.49	58.39	58.39	6%	21.4
35	PR-45	HDR	7.2	161	20	0.16	1948	143	23,023	13.10	15.99	21.12	25.79	33.58	53.72	53.72	6%	19.8
36	PR-46	HDR	7.9	175	20	0.16	1966	143	25,025	14.20	17.38	22.91	28.03	36.49	58.39	58.39	6%	21.4
37	PR-47	HDR	8.39	185	20	0.16	1976	143	26,455	15.00	18.37	24.20	29.63	38.58	61.73	61.73	6%	22.6
38	PR-48	HDR	7.72	171	20	0.16	1967	143	24,453	13.88	16.98	22.39	27.39	35.66	57.06	57.06	6%	20.9
39	PR-49	HDR	5.66	129	20	0.16	1911	143	18,447	10.54	12.81	17.00	20.66	26.90	43.04	43.04	6%	15.9
40	PR-50	HDR	11.43	245	20	0.16	2032	143	35,035	19.74	24.33	31.84	39.24	51.09	81.75	81.75	6%	29.8
41	PR-51	HDR	11.24	241	20	0.16	2032	143	34,463	19.42	23.93	31.32	38.60	50.26	80.41	80.41	6%	29.3
42	PR-52	HDR	0	0	20	0.16	-	143	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6%	0.0
43	PR-61	GC	3.56	0	0	1.25	1116	3,973	1.69	2.76	2.72	4.45	5.79	9.27	9.27	0%	2.7	
44	PR-62	GC	22.07	0	0	1.25	1116	24,630	10.45	17.10	16.86	27.59	35.92	57.47	57.47	0%	16.9	
45	PR-63	CMU	4.06	0	0	1.25	1116	4,531	1.92	3.15	3.10	5.08	6.61	10.57	10.57	0%	3.1	
46	PR-64	CMU	6.09	0	0	1.25	1116	6,796	2.88	4.72	4.65	7.61	9.91	15.86	15.86	0%	4.7	
47	PR-65	CMU	7.92	0	0	1.25	1116	8,839	3.75	6.14	6.05	9.90	12.89	20.62	20.62	0%	6.1	
48	PR-66	CMU	15.68	0	0	1.25	1116	17,499	7.43	12.15	11.98	19.60	25.52	40.83	40.83	0%	12.0	
49	PR-67	CMU	7.55	0	0	1.25	1116	8,426	3.58	5.85	5.77	9.44	12.29	19.66	19.66	0%	5.8	
50	PR-68	CMU	7.5	0	0	1.25	1116	8,370	3.55	5.81	5.73	9.38	12.21	19.53	19.53	0%	5.7	
51	PR-70	CP	15.52	0	0	1.66	1482	23,001	11.30	15.97	18.22	25.76	33.54	53.67	53.67	0%	18.2	
52	PR-71	CP	21.52	0	0	1.66	1482	31,893	15.66	22.15	25.27	35.72	46.51	74.42	74.42	0%	25.3	
53	PR-72	CP	26.08	0	0	1.66	1482	38,651	18.98	26.84	30.62	43.29	56.37	90.18	90.18	0%	30.6	
54	PR-73	CP	35.24	0	0	1.66	1482	52,226	25.65	36.27	41.37	58.50	76.16	121.86	121.86	0%	41.4	
55	PR-74	CP	19.62	0	0	1.66	1482	29,077	14.28	20.19	23.04	32.57	42.40	67.85	67.85	0%	23.0	
56	PR-75	CP	14.42	0	0	1.66	1482	21,370	10.50	14.84	16.93	23.94	31.17	49.86	49.86	0%	16.9	
57	PR-76	CP	12.86	0	0	1.66	1482	19,059	9.36	13.24	15.10	21.35	27.79	44.47	44.47	0%	15.1	
58	PR-77	CP	10.98	0	0	1.66	1482	16,272	7.99	11.30	12.89	18.23	23.73	37.97	37.97	0%	12.9	
59	PR-78	CP	10.38	0	0	1.66	1482	15,383	7.56	10.68	12.19	17.23	22.43	35.89	35.89	0%	12.2	
60	PR-79	CP	23.75	0	0	1.66	1482	35,198	17.29	24.44	27.88	39.43	51.33	82.13	82.13	0%	27.9	
61	PR-80	CP	17.58	0	0	1.66	1482	26,054	12.80	18.09	20.64	29.18	37.99	60.79	60.79	0%	20.6	
62	PR-81	CP	4.49	0	0	1.66	1482	6,654	3.27	4.62	5.27	7.45	9.70	15.53	15.53	0%	5.3	
63	PR-82	CP	26.92	0	0	1.66	1482	39,895	19.59	27.71	31.61	44.69	58.18	93.09	93.09	0%	31.6	
64	PR-83	CP	26.39	0	0	1.66	1482	39,110	19.21	27.16	30.98	43.81	57.04	91.26	91.26	0%	31.0	
65	PR-84	CP	25.74	0	0	1.66	1482	38,147	18.74	26.49	30.22	42.73	55.63	89.01	89.01	0%	30.2	
66	PR-85	CP	33.93	0	0	1.66	1482	50,284	24.70	34.92	39.84	56.33	73.33	117.33	117.33	0%	39.8	
67	PR-86	CP	13.84	0	0	1.66	1482	20,511	10.07	14.24	16.25	22.98	29.91	47.86	47.86	0%	16.2	
68	PR-87	CP	18.26	0	0	1.66	1482	27,061	13.29	18.79	21.44	30.31	39.46	63.14	63.14	0%	21.4	
69	PR-88	CP	13.17	0	0	1.66	1482	19,518	9.59	13.55	15.46	21.86	28.46	45.54	45.54	0%	15.5	
70	PR-89	CP	13.42	0	0	1.66	1482	19,888	9.77	13.81	15.76	22.28	29.00	46.41	46.41	0%	15.8	
71	PR-90	CP	11.42	0	0	1.66	1482	16,924	8.31	11.75	13.41	18.96	24.68	39				

APPENDIX B

InfoWater Water Model Junction and Pipe Output Reports



Placer Ranch PWMP - InforWater Output Report - Junction Pressure

	ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
<input type="checkbox"/>	J354	72.17	34:30	70.86	06:00	71.71	1.30
<input type="checkbox"/>	PR-02	72.03	34:30	71.41	06:00	71.82	0.62
<input type="checkbox"/>	PR-03	73.97	34:30	72.48	06:00	73.44	1.49
<input type="checkbox"/>	PR-04	81.67	34:30	81.56	06:00	81.63	0.10
<input type="checkbox"/>	PR-05	72.97	34:30	72.95	06:00	72.96	0.02
<input type="checkbox"/>	PR-06	71.57	34:30	71.51	06:00	71.55	0.06
<input type="checkbox"/>	PR-07	69.81	34:30	69.76	06:00	69.79	0.05
<input type="checkbox"/>	PR-08	65.45	34:30	65.41	06:00	65.43	0.04
<input type="checkbox"/>	PR-09	64.58	34:30	64.54	06:00	64.56	0.04
<input type="checkbox"/>	PR-10	64.57	34:30	64.54	06:00	64.56	0.03
<input type="checkbox"/>	PR-100	65.27	34:30	64.92	06:00	65.15	0.34
<input type="checkbox"/>	PR-101	66.53	34:30	66.13	06:00	66.39	0.40
<input type="checkbox"/>	PR-102	66.96	34:30	66.53	06:00	66.81	0.43
<input type="checkbox"/>	PR-103	69.11	34:30	68.66	06:00	68.95	0.45
<input type="checkbox"/>	PR-104	68.67	34:30	68.18	06:00	68.50	0.48
<input type="checkbox"/>	PR-105	69.06	34:30	68.60	06:00	68.90	0.46
<input type="checkbox"/>	PR-106	70.83	34:30	70.39	06:00	70.68	0.44
<input type="checkbox"/>	PR-107	69.55	34:30	69.12	06:00	69.40	0.42
<input type="checkbox"/>	PR-108	65.69	34:30	65.32	06:00	65.56	0.37
<input type="checkbox"/>	PR-109	63.55	34:30	63.22	06:00	63.43	0.33
<input type="checkbox"/>	PR-11	65.87	34:30	65.84	06:00	65.86	0.03
<input type="checkbox"/>	PR-110	64.02	34:30	63.76	06:00	63.93	0.27
<input type="checkbox"/>	PR-111	65.78	34:30	65.56	06:00	65.70	0.22
<input type="checkbox"/>	PR-112	62.77	34:30	62.59	06:00	62.71	0.19
<input type="checkbox"/>	PR-113	66.26	34:30	66.12	06:00	66.22	0.14
<input type="checkbox"/>	PR-114	68.02	34:30	67.93	06:00	67.99	0.10
<input type="checkbox"/>	PR-115	69.55	34:30	69.16	06:00	69.41	0.39
<input type="checkbox"/>	PR-116	68.27	34:30	67.93	06:00	68.15	0.34
<input type="checkbox"/>	PR-117	67.00	34:30	66.69	06:00	66.89	0.31
<input type="checkbox"/>	PR-118	65.73	34:30	65.45	06:00	65.63	0.28
<input type="checkbox"/>	PR-119	65.75	34:30	65.50	06:00	65.66	0.24
<input type="checkbox"/>	PR-12	66.74	34:30	66.71	06:00	66.73	0.03
<input type="checkbox"/>	PR-120	63.61	34:30	63.41	06:00	63.54	0.20
<input type="checkbox"/>	PR-121	61.47	34:30	61.30	06:00	61.41	0.17
<input type="checkbox"/>	PR-122	64.10	34:30	63.98	06:00	64.06	0.12
<input type="checkbox"/>	PR-123	66.28	34:30	66.20	06:00	66.25	0.08
<input type="checkbox"/>	PR-124	63.23	34:30	63.12	06:00	63.20	0.11
<input type="checkbox"/>	PR-125	62.79	34:30	62.67	06:00	62.75	0.12
<input type="checkbox"/>	PR-126	62.36	34:30	62.23	06:00	62.32	0.13
<input type="checkbox"/>	PR-127	64.53	34:30	64.39	06:00	64.48	0.15
<input type="checkbox"/>	PR-128	64.92	34:30	64.69	06:00	64.84	0.23
<input type="checkbox"/>	PR-129	63.61	34:30	63.39	06:00	63.54	0.22
<input type="checkbox"/>	PR-13	63.71	34:30	63.68	06:00	63.70	0.03
<input type="checkbox"/>	PR-130	63.61	34:30	63.40	06:00	63.54	0.22
<input type="checkbox"/>	PR-131	61.44	34:30	61.24	06:00	61.37	0.21
<input type="checkbox"/>	PR-132	62.74	34:30	62.55	06:00	62.68	0.20
<input type="checkbox"/>	PR-133	64.43	34:30	64.16	06:00	64.33	0.27
<input type="checkbox"/>	PR-134	67.46	34:30	67.18	06:00	67.36	0.28
<input type="checkbox"/>	PR-135	66.54	34:30	66.20	06:00	66.42	0.34
<input type="checkbox"/>	PR-136	65.27	34:30	64.89	06:00	65.14	0.38

Placer Ranch PWMP - InforWater Output Report - Junction Pressure

ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
PR-137	67.87	34:30	67.49	06:00	67.74	0.38
PR-139	74.35	34:30	72.99	06:00	73.87	1.36
PR-14	62.42	34:30	62.40	06:00	62.41	0.02
PR-140	73.05	34:30	71.71	06:00	72.58	1.35
PR-141	74.37	34:30	73.04	06:00	73.90	1.33
PR-142	72.21	34:30	70.90	06:00	71.75	1.31
PR-143	73.96	34:30	72.67	06:00	73.50	1.28
PR-144	72.54	34:30	71.18	06:00	72.05	1.35
PR-145	71.67	34:30	70.31	06:00	71.19	1.37
PR-146	73.85	34:30	72.47	06:00	73.36	1.38
PR-147	78.55	34:30	77.10	06:00	78.03	1.44
PR-148	78.10	34:30	76.66	06:00	77.59	1.44
PR-149	77.63	34:30	76.20	06:00	77.12	1.43
PR-15	61.99	34:30	61.97	06:00	61.98	0.02
PR-150	77.22	34:30	75.74	06:00	76.69	1.48
PR-151	77.63	34:30	76.15	06:00	77.10	1.47
PR-152	75.47	34:30	74.00	06:00	74.95	1.47
PR-153	74.18	34:30	72.72	06:00	73.66	1.46
PR-154	75.92	34:30	74.47	06:00	75.41	1.45
PR-155	75.90	34:30	74.49	06:00	75.40	1.40
PR-156	73.88	34:30	72.52	06:00	73.40	1.37
PR-157	73.42	34:30	72.03	06:00	72.93	1.39
PR-16	69.33	34:30	68.56	06:00	69.07	0.77
PR-160	74.51	34:30	73.02	06:00	73.98	1.49
PR-161	74.59	34:30	73.37	06:00	74.16	1.22
PR-162	74.59	34:30	73.37	06:00	74.16	1.22
PR-163	75.89	34:30	74.68	06:00	75.47	1.21
PR-164	72.42	34:30	71.21	06:00	72.00	1.21
PR-166	76.94	34:30	75.44	06:00	76.41	1.50
PR-167	75.99	34:30	74.42	06:00	75.43	1.57
PR-168	78.56	34:30	76.99	06:00	78.00	1.57
PR-169	80.27	34:30	78.71	06:00	79.71	1.56
PR-17	73.71	34:30	72.99	06:00	73.46	0.71
PR-170	74.69	34:30	73.27	06:00	74.19	1.42
PR-171	77.24	34:30	75.75	06:00	76.71	1.49
PR-18	72.02	34:30	71.31	06:00	71.78	0.71
PR-180	13.00	28:10	13.00	00:00	13.00	0.00
PR-181	71.45	34:30	70.60	06:00	71.16	0.85
PR-19	71.56	34:30	70.72	06:00	71.28	0.84
PR-20	72.87	34:30	72.06	06:00	72.60	0.81
PR-21	69.84	34:30	69.07	06:00	69.58	0.77
PR-22	68.98	34:30	68.25	06:00	68.73	0.73
PR-26	81.44	34:30	81.23	06:00	81.37	0.20
PR-27	68.90	34:30	68.77	06:00	68.85	0.13
PR-28	64.54	34:30	64.38	06:00	64.48	0.15
PR-29	67.54	34:30	67.35	06:00	67.48	0.20
PR-30	65.79	34:30	65.56	06:00	65.71	0.23
PR-31	68.37	34:30	68.10	06:00	68.28	0.26
PR-32	67.89	34:30	67.55	06:00	67.77	0.34
PR-33	66.14	34:30	65.76	06:00	66.01	0.38

Placer Ranch PWMP - InforWater Output Report - Junction Pressure

	ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
<input type="checkbox"/>	PR-34	63.93	34:30	63.48	06:00	63.77	0.45
<input type="checkbox"/>	PR-35	69.09	34:30	68.58	06:00	68.91	0.51
<input type="checkbox"/>	PR-36	68.92	34:30	68.13	06:00	68.65	0.79
<input type="checkbox"/>	PR-37	71.87	34:30	70.93	06:00	71.54	0.94
<input type="checkbox"/>	PR-38	73.89	34:30	72.80	06:00	73.51	1.09
<input type="checkbox"/>	PR-39	74.74	34:30	73.64	06:00	74.35	1.10
<input type="checkbox"/>	PR-40	73.81	34:30	72.66	06:00	73.40	1.15
<input type="checkbox"/>	PR-41	74.59	34:30	73.38	06:00	74.17	1.21
<input type="checkbox"/>	PR-42	76.26	34:30	74.98	06:00	75.81	1.28
<input type="checkbox"/>	PR-43	77.04	34:30	75.71	06:00	76.57	1.34
<input type="checkbox"/>	PR-44	77.00	34:30	75.64	06:00	76.52	1.35
<input type="checkbox"/>	PR-45	76.95	34:30	75.59	06:00	76.47	1.36
<input type="checkbox"/>	PR-46	76.92	34:30	75.53	06:00	76.43	1.38
<input type="checkbox"/>	PR-47	74.29	34:30	72.89	06:00	73.79	1.39
<input type="checkbox"/>	PR-48	77.70	34:30	76.25	06:00	77.19	1.45
<input type="checkbox"/>	PR-49	78.99	34:30	77.54	06:00	78.48	1.45
<input type="checkbox"/>	PR-50	76.39	34:30	74.92	06:00	75.87	1.46
<input type="checkbox"/>	PR-51	78.98	34:30	77.51	06:00	78.45	1.47
<input type="checkbox"/>	PR-52	77.25	34:30	75.77	06:00	76.72	1.48
<input type="checkbox"/>	PR-53	77.23	34:30	75.68	06:00	76.68	1.55
<input type="checkbox"/>	PR-54	78.92	34:30	77.38	06:00	78.37	1.54
<input type="checkbox"/>	PR-55	73.68	34:30	72.15	06:00	73.14	1.54
<input type="checkbox"/>	PR-56	73.64	34:30	72.11	06:00	73.09	1.52
<input type="checkbox"/>	PR-57	73.23	34:30	71.96	06:00	72.79	1.27
<input type="checkbox"/>	PR-58	74.04	34:30	72.54	06:00	73.50	1.50
<input type="checkbox"/>	PR-59	74.89	34:30	73.40	06:00	74.36	1.50
<input type="checkbox"/>	PR-60	74.01	34:30	72.53	06:00	73.48	1.48
<input type="checkbox"/>	PR-61	73.21	34:30	71.76	06:00	72.70	1.45
<input type="checkbox"/>	PR-62	73.67	34:30	72.23	06:00	73.16	1.43
<input type="checkbox"/>	PR-63	75.43	34:30	74.01	06:00	74.93	1.42
<input type="checkbox"/>	PR-64	75.06	34:30	73.68	06:00	74.57	1.38
<input type="checkbox"/>	PR-65	74.67	34:30	73.30	06:00	74.18	1.37
<input type="checkbox"/>	PR-66	72.97	34:30	71.62	06:00	72.49	1.35
<input type="checkbox"/>	PR-67	72.17	34:30	70.86	06:00	71.71	1.30
<input type="checkbox"/>	PR-68	73.53	34:30	72.27	06:00	73.09	1.26
<input type="checkbox"/>	PR-69	71.90	34:30	70.70	06:00	71.47	1.20
<input type="checkbox"/>	PR-70	74.17	34:30	73.05	06:00	73.77	1.12
<input type="checkbox"/>	PR-71	67.36	34:30	66.40	06:00	67.02	0.96
<input type="checkbox"/>	PR-72	69.15	34:30	68.25	06:00	68.83	0.90
<input type="checkbox"/>	PR-73	70.09	34:30	69.29	06:00	69.81	0.81
<input type="checkbox"/>	PR-74	73.16	34:30	72.40	06:00	72.90	0.76
<input type="checkbox"/>	PR-75	68.92	34:30	68.29	06:00	68.70	0.63
<input type="checkbox"/>	PR-76	67.70	34:30	67.17	06:00	67.51	0.53
<input type="checkbox"/>	PR-77	67.75	34:30	67.27	06:00	67.58	0.47
<input type="checkbox"/>	PR-78	68.21	34:30	67.78	06:00	68.06	0.43
<input type="checkbox"/>	PR-79	70.01	34:30	69.66	06:00	69.89	0.34
<input type="checkbox"/>	PR-80	68.30	34:30	67.99	06:00	68.19	0.30
<input type="checkbox"/>	PR-81	67.46	34:30	67.19	06:00	67.37	0.26
<input type="checkbox"/>	PR-82	65.32	34:30	65.09	06:00	65.24	0.23
<input type="checkbox"/>	PR-83	63.61	34:30	63.43	06:00	63.55	0.19

Placer Ranch PWMP - InforWater Output Report - Junction Pressure

	ID	Max.Value (psi)	Max.Time (hrs.)	Min.Value (psi)	Min.Time (hrs.)	Average (psi)	Difference (psi)
<input type="checkbox"/>	PR-84	63.64	34:30	63.49	06:00	63.59	0.15
<input type="checkbox"/>	PR-85	63.24	34:30	63.14	06:00	63.20	0.10
<input type="checkbox"/>	PR-86	68.91	34:30	68.10	06:00	68.63	0.81
<input type="checkbox"/>	PR-87	72.43	34:30	71.67	06:00	72.17	0.77
<input type="checkbox"/>	PR-88	72.91	34:30	72.18	06:00	72.66	0.73
<input type="checkbox"/>	PR-89	73.84	34:30	73.20	06:00	73.63	0.64
<input type="checkbox"/>	PR-90	76.97	34:30	76.45	06:00	76.80	0.52
<input type="checkbox"/>	PR-91	77.03	34:30	76.59	06:00	76.88	0.44
<input type="checkbox"/>	PR-92	76.65	34:30	76.29	06:00	76.54	0.36
<input type="checkbox"/>	PR-93	76.65	34:30	76.12	06:00	76.49	0.53
<input type="checkbox"/>	PR-94	61.95	34:30	61.87	06:00	61.92	0.08
<input type="checkbox"/>	PR-95	60.19	34:30	60.07	06:00	60.15	0.13
<input type="checkbox"/>	PR-96	60.60	34:30	60.43	06:00	60.54	0.17
<input type="checkbox"/>	PR-97	63.61	34:30	63.40	06:00	63.54	0.21
<input type="checkbox"/>	PR-98	64.89	34:30	64.64	06:00	64.80	0.25
<input type="checkbox"/>	PR-99	63.99	34:30	63.71	06:00	63.90	0.28

Placer Ranch PWMP - InforWater Output Report - Pipeline Velocity

	ID	Max.Value (ft/s)	Max.Time (hrs.)	Min.Value (ft/s)	Min.Time (hrs.)	Average (ft/s)	Difference (ft/s)
<input type="checkbox"/>	P01	1.34	06:00	0.56	34:30	0.87	0.78
<input type="checkbox"/>	P103	1.36	06:00	1.16	34:30	1.24	0.21
<input type="checkbox"/>	P105	1.22	06:00	1.11	34:30	1.16	0.11
<input type="checkbox"/>	P107	1.71	06:00	1.35	34:30	1.50	0.36
<input type="checkbox"/>	P109	1.65	06:10	1.33	34:30	1.46	0.32
<input type="checkbox"/>	P11	5.61	06:00	3.16	34:30	4.10	2.44
<input type="checkbox"/>	P111	1.70	06:00	1.16	34:30	1.37	0.54
<input type="checkbox"/>	P113	1.11	06:00	0.70	34:30	0.86	0.41
<input type="checkbox"/>	P115	1.10	06:00	0.70	34:30	0.86	0.40
<input type="checkbox"/>	P117	1.09	06:00	0.70	34:30	0.85	0.40
<input type="checkbox"/>	P119	0.61	06:00	0.25	34:30	0.39	0.36
<input type="checkbox"/>	P121	1.36	06:00	0.57	34:30	0.88	0.79
<input type="checkbox"/>	P123	0.86	14:00	0.80	06:00	0.85	0.06
<input type="checkbox"/>	P125	0.85	11:30	0.79	06:00	0.84	0.06
<input type="checkbox"/>	P127	0.80	34:30	0.64	06:00	0.75	0.16
<input type="checkbox"/>	P129	1.14	06:00	0.85	34:30	0.97	0.28
<input type="checkbox"/>	P13	0.00	00:00	0.00	00:00	0.00	0.00
<input type="checkbox"/>	P131	0.74	34:30	0.45	06:00	0.64	0.29
<input type="checkbox"/>	P133	0.74	34:30	0.44	06:00	0.64	0.30
<input type="checkbox"/>	P135	0.66	34:30	0.20	06:00	0.49	0.46
<input type="checkbox"/>	P137	3.10	06:00	2.51	34:30	2.74	0.59
<input type="checkbox"/>	P139	3.10	06:00	2.51	34:30	2.74	0.59
<input type="checkbox"/>	P141	3.11	06:00	2.51	34:30	2.74	0.60
<input type="checkbox"/>	P143	3.06	06:00	2.44	34:30	2.68	0.63
<input type="checkbox"/>	P145	3.07	06:00	2.44	34:30	2.68	0.63
<input type="checkbox"/>	P147	3.08	06:00	2.44	34:30	2.69	0.64
<input type="checkbox"/>	P149	3.12	06:00	2.41	34:30	2.68	0.71
<input type="checkbox"/>	P15	0.00	00:00	0.00	00:00	0.00	0.00
<input type="checkbox"/>	P151	3.14	06:00	2.41	34:30	2.69	0.72
<input type="checkbox"/>	P153	3.44	06:00	2.58	34:30	2.91	0.86
<input type="checkbox"/>	P157	4.52	06:10	2.94	34:30	3.55	1.58
<input type="checkbox"/>	P159	4.55	06:00	2.95	34:30	3.57	1.60
<input type="checkbox"/>	P161	4.57	06:00	2.95	34:30	3.58	1.61
<input type="checkbox"/>	P163	4.58	06:00	2.96	34:30	3.58	1.62
<input type="checkbox"/>	P165	4.75	06:00	3.01	34:30	3.68	1.74
<input type="checkbox"/>	P167	4.76	06:00	3.02	34:30	3.69	1.75
<input type="checkbox"/>	P169	4.77	06:00	3.02	34:50	3.70	1.75
<input type="checkbox"/>	P171	4.51	06:10	2.81	34:30	3.46	1.70
<input type="checkbox"/>	P173	4.52	06:00	2.81	34:30	3.47	1.70
<input type="checkbox"/>	P175	4.52	06:00	2.80	34:40	3.46	1.72
<input type="checkbox"/>	P177	4.53	06:00	2.80	34:30	3.47	1.73
<input type="checkbox"/>	P179	4.57	06:00	2.79	34:30	3.48	1.78
<input type="checkbox"/>	P181	4.58	06:00	2.80	34:30	3.49	1.79
<input type="checkbox"/>	P183	4.64	06:00	2.81	34:30	3.52	1.83
<input type="checkbox"/>	P185	4.64	06:00	2.81	34:30	3.52	1.83
<input type="checkbox"/>	P187	4.72	06:00	2.85	34:30	3.57	1.87
<input type="checkbox"/>	P189	1.71	06:00	1.31	34:40	1.47	0.40
<input type="checkbox"/>	P191	1.92	06:00	1.38	34:40	1.59	0.54
<input type="checkbox"/>	P193	1.93	06:00	1.38	34:40	1.60	0.54
<input type="checkbox"/>	P195	2.46	06:00	1.56	34:40	1.91	0.90

Placer Ranch PWMP - InforWater Output Report - Pipeline Velocity

	ID	Max.Value (ft/s)	Max.Time (hrs.)	Min.Value (ft/s)	Min.Time (hrs.)	Average (ft/s)	Difference (ft/s)
<input type="checkbox"/>	P197	2.46	06:00	1.56	34:40	1.91	0.90
<input type="checkbox"/>	P199	2.46	06:00	1.56	34:40	1.91	0.90
<input type="checkbox"/>	P201	2.46	06:00	1.56	34:40	1.91	0.90
<input type="checkbox"/>	P203	2.61	06:20	0.37	34:40	1.27	2.24
<input type="checkbox"/>	P205	2.58	06:10	0.36	34:40	1.25	2.21
<input type="checkbox"/>	P207	2.65	06:00	1.33	34:30	1.86	1.32
<input type="checkbox"/>	P209	2.58	06:00	1.31	34:30	1.82	1.27
<input type="checkbox"/>	P21	3.22	06:00	2.68	34:30	2.89	0.54
<input type="checkbox"/>	P211	2.62	06:00	1.51	34:30	1.94	1.11
<input type="checkbox"/>	P213	2.53	06:00	1.48	34:30	1.89	1.05
<input type="checkbox"/>	P215	2.57	06:00	1.59	34:30	1.97	0.98
<input type="checkbox"/>	P217	2.53	06:00	1.57	34:30	1.95	0.96
<input type="checkbox"/>	P219	2.70	06:00	1.51	34:30	1.98	1.19
<input type="checkbox"/>	P221	2.64	06:00	1.49	34:30	1.94	1.15
<input type="checkbox"/>	P223	1.80	06:00	0.94	34:30	1.27	0.87
<input type="checkbox"/>	P225	1.76	06:00	0.92	34:30	1.25	0.84
<input type="checkbox"/>	P227	1.74	06:00	0.91	34:30	1.24	0.82
<input type="checkbox"/>	P229	1.69	06:00	0.90	34:30	1.21	0.79
<input type="checkbox"/>	P23	3.69	06:00	3.00	34:30	3.27	0.68
<input type="checkbox"/>	P231	1.45	06:00	1.15	34:30	1.27	0.30
<input type="checkbox"/>	P233	1.46	06:00	1.15	34:30	1.28	0.31
<input type="checkbox"/>	P235	1.53	06:00	1.00	34:30	1.21	0.53
<input type="checkbox"/>	P237	1.56	06:00	1.01	34:50	1.23	0.55
<input type="checkbox"/>	P239	1.64	06:00	1.04	34:30	1.27	0.60
<input type="checkbox"/>	P241	1.80	06:00	1.09	34:30	1.37	0.71
<input type="checkbox"/>	P243	1.83	06:00	1.10	34:30	1.38	0.73
<input type="checkbox"/>	P245	2.02	06:00	1.16	34:30	1.49	0.86
<input type="checkbox"/>	P247	1.96	06:00	1.17	34:30	1.47	0.79
<input type="checkbox"/>	P249	1.97	06:00	1.17	34:40	1.48	0.80
<input type="checkbox"/>	P25	3.66	06:00	2.99	34:30	3.25	0.66
<input type="checkbox"/>	P251	2.03	06:00	1.15	34:30	1.47	0.87
<input type="checkbox"/>	P253	2.04	06:00	1.16	34:30	1.48	0.88
<input type="checkbox"/>	P255	1.97	06:00	1.04	34:30	1.40	0.94
<input type="checkbox"/>	P257	1.99	06:00	1.04	34:30	1.41	0.95
<input type="checkbox"/>	P259	1.97	06:10	1.25	34:50	1.54	0.72
<input type="checkbox"/>	P261	1.97	06:10	1.25	34:50	1.54	0.72
<input type="checkbox"/>	P263	1.95	06:00	1.22	34:30	1.50	0.73
<input type="checkbox"/>	P265	2.03	06:00	1.25	34:30	1.55	0.78
<input type="checkbox"/>	P267	1.97	06:00	1.17	34:30	1.48	0.80
<input type="checkbox"/>	P269	2.06	06:00	1.20	34:30	1.54	0.86
<input type="checkbox"/>	P27	1.24	34:30	1.07	06:00	1.19	0.18
<input type="checkbox"/>	P271	1.93	06:00	1.04	34:30	1.39	0.88
<input type="checkbox"/>	P273	1.97	06:00	1.05	34:30	1.41	0.91
<input type="checkbox"/>	P275	0.86	06:00	0.44	34:30	0.59	0.42
<input type="checkbox"/>	P277	0.75	06:00	0.40	34:30	0.52	0.35
<input type="checkbox"/>	P279	0.60	06:00	0.24	34:30	0.37	0.36
<input type="checkbox"/>	P281	0.49	06:00	0.20	34:30	0.30	0.29
<input type="checkbox"/>	P283	0.39	06:00	0.00	56:30	0.17	0.39
<input type="checkbox"/>	P285	0.29	34:50	0.00	27:30	0.15	0.29
<input type="checkbox"/>	P287	0.34	34:30	0.00	28:00	0.17	0.34

Placer Ranch PWMP - InforWater Output Report - Pipeline Velocity

ID	Max.Value (ft/s)	Max.Time (hrs.)	Min.Value (ft/s)	Min.Time (hrs.)	Average (ft/s)	Difference (ft/s)
P289	0.32	06:00	0.01	32:00	0.17	0.32
P29	1.23	34:30	1.01	06:00	1.16	0.21
P291	0.32	34:30	0.07	06:00	0.22	0.25
P293	0.24	34:30	0.00	31:40	0.11	0.24
P295	0.24	34:30	0.00	68:20	0.12	0.24
P297	0.30	06:00	0.00	03:50	0.12	0.30
P299	0.33	06:00	0.00	03:20	0.13	0.33
P301	0.43	06:00	0.03	34:40	0.19	0.40
P303	0.51	06:00	0.06	34:30	0.24	0.45
P305	0.58	06:00	0.14	34:30	0.31	0.44
P307	0.66	06:00	0.16	34:30	0.36	0.50
P309	0.47	06:00	0.00	61:30	0.18	0.47
P31	0.68	34:30	0.00	06:10	0.44	0.68
P311	0.43	06:00	0.01	57:30	0.16	0.42
P313	0.40	06:00	0.00	09:40	0.15	0.40
P315	0.38	06:00	0.01	09:40	0.14	0.38
P317	0.21	34:30	0.00	53:40	0.13	0.20
P319	0.20	34:30	0.00	29:20	0.12	0.20
P321	0.29	06:00	0.10	34:30	0.17	0.20
P323	0.01	06:00	0.00	34:40	0.01	0.01
P327	0.62	06:00	0.29	34:30	0.42	0.33
P329	0.75	06:00	0.33	34:30	0.50	0.42
P33	0.66	34:30	0.03	53:30	0.41	0.63
P331	1.39	06:00	0.83	34:30	1.05	0.56
P333	1.55	06:00	0.88	34:30	1.15	0.67
P335	1.57	06:00	0.89	34:30	1.16	0.68
P337	1.58	06:00	0.89	34:30	1.16	0.68
P339	0.49	06:00	0.01	01:10	0.24	0.48
P341	0.48	06:00	0.00	01:10	0.24	0.48
P343	0.46	34:30	0.00	31:50	0.24	0.45
P345	1.33	06:00	1.09	34:30	1.19	0.24
P347	0.88	34:30	0.85	06:00	0.87	0.03
P349	0.83	34:30	0.71	06:00	0.79	0.12
P35	0.31	34:30	0.13	06:00	0.21	0.18
P351	1.08	34:30	0.96	06:00	1.04	0.12
P353	1.00	34:30	0.72	06:00	0.89	0.28
P355	1.08	06:00	0.99	34:30	1.02	0.09
P357	0.90	34:30	0.81	06:00	0.87	0.09
P359	0.80	06:00	0.60	34:30	0.68	0.20
P361	0.93	06:00	0.65	34:30	0.76	0.28
P363	0.94	06:00	0.65	34:30	0.76	0.29
P365	0.95	06:00	0.65	34:30	0.77	0.30
P367	3.05	06:00	2.43	34:30	2.67	0.62
P369	1.21	06:00	0.90	34:30	1.02	0.31
P37	0.32	34:30	0.16	06:00	0.23	0.16
P371	1.32	06:00	1.09	34:30	1.18	0.24
P373	0.43	06:00	0.00	25:50	0.18	0.43
P379	1.41	34:30	1.32	06:00	1.38	0.09
P381	1.60	06:00	1.50	34:30	1.54	0.10
P383	0.01	06:00	0.00	34:30	0.01	0.01

Placer Ranch PWMP - InforWater Output Report - Pipeline Velocity

ID	Max.Value (ft/s)	Max.Time (hrs.)	Min.Value (ft/s)	Min.Time (hrs.)	Average (ft/s)	Difference (ft/s)
P385	0.48	06:00	0.16	34:30	0.28	0.32
P387	0.27	34:30	0.17	06:00	0.23	0.11
P389	0.26	34:30	0.13	06:00	0.21	0.13
P39	1.03	06:00	0.79	34:30	0.86	0.24
P391	1.48	06:00	0.48	34:30	0.88	1.00
P395	1.71	06:00	1.04	34:30	1.30	0.67
P397	1.22	06:00	0.88	34:30	1.02	0.35
P399	0.77	06:00	0.73	34:30	0.75	0.04
P401	0.62	34:30	0.43	06:00	0.55	0.18
P403	0.37	06:00	0.00	08:10	0.17	0.37
P405	1.56	06:00	1.11	34:30	1.29	0.44
P41	1.06	06:00	0.80	34:30	0.88	0.26
P415	0.33	34:30	0.00	47:10	0.18	0.33
P417	3.48	06:00	2.59	34:30	2.93	0.88
P421	1.45	06:00	0.96	34:30	1.15	0.49
P423	1.73	06:00	1.27	34:30	1.45	0.45
P425	0.00	00:00	0.00	00:00	0.00	0.00
P427	0.00	00:00	0.00	00:00	0.00	0.00
P429	0.00	00:00	0.00	00:00	0.00	0.00
P43	1.07	06:00	0.80	34:30	0.88	0.27
P435	0.00	00:00	0.00	00:00	0.00	0.00
P437	4.92	06:00	3.00	34:30	3.73	1.92
P439	2.58	06:00	0.36	34:30	1.25	2.21
P441	3.69	06:00	3.00	34:30	3.27	0.68
P443	4.78	06:00	2.89	34:30	3.61	1.89
P45	4.92	06:00	3.00	34:30	3.73	1.92
P47	4.80	06:00	2.90	34:30	3.62	1.90
P49	4.80	06:00	2.90	34:30	3.62	1.90
P5	3.77	06:10	1.09	34:40	2.16	2.68
P51	2.24	06:00	0.74	34:30	1.32	1.50
P53	0.54	06:00	0.18	34:30	0.32	0.36
P55	0.67	06:00	0.22	34:30	0.39	0.45
P57	0.80	06:00	0.26	34:30	0.47	0.54
P59	0.93	06:00	0.31	34:30	0.55	0.63
P67	3.77	06:10	1.09	34:40	2.15	2.68
P69	2.49	06:00	1.71	34:30	2.00	0.77
P7	3.69	06:00	3.01	34:40	3.27	0.69
P71	2.43	06:00	1.70	34:30	1.97	0.74
P73	2.53	06:00	1.54	34:30	1.91	0.98
P75	2.45	06:00	1.52	34:30	1.87	0.93
P77	2.41	06:00	1.37	34:30	1.77	1.04
P79	2.37	06:00	1.36	34:30	1.75	1.01
P81	2.33	06:00	1.35	34:30	1.72	0.98
P83	2.16	06:00	1.29	34:30	1.62	0.87
P85	2.02	06:00	1.25	34:30	1.54	0.78
P87	3.71	06:00	2.14	34:30	2.75	1.57
P89	3.51	06:00	2.08	34:30	2.63	1.43
P9	2.49	06:00	0.82	34:30	1.46	1.67
P91	2.56	06:00	1.76	34:30	2.07	0.79
P93	2.36	06:00	1.70	34:30	1.96	0.66

Placer Ranch PWMP - InforWater Output Report - Pipeline Velocity

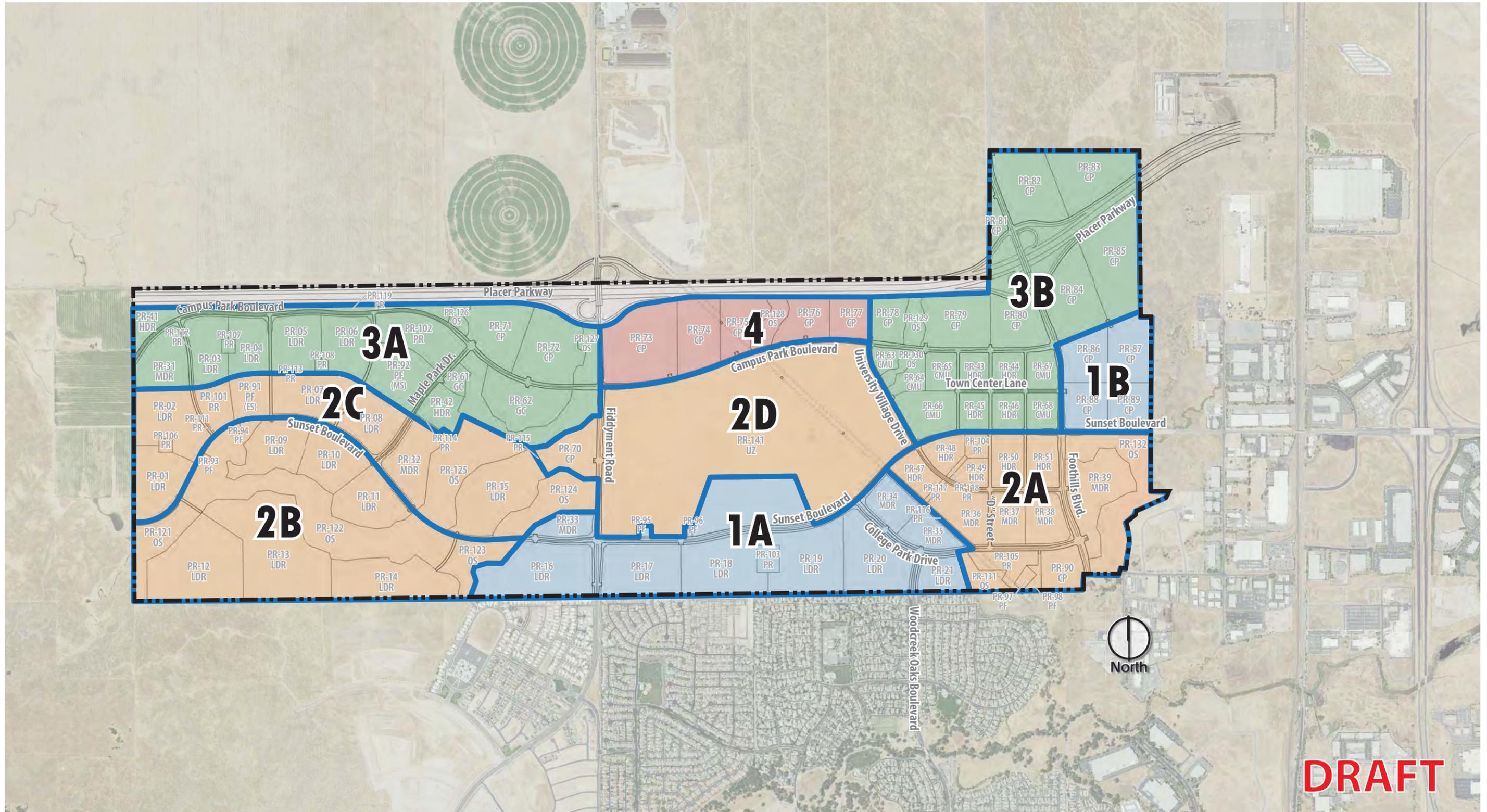
	ID	Max.Value (ft/s)	Max.Time (hrs.)	Min.Value (ft/s)	Min.Time (hrs.)	Average (ft/s)	Difference (ft/s)
<input type="checkbox"/>	P95	2.35	06:00	1.70	34:30	1.95	0.66
<input type="checkbox"/>	P97	2.26	06:00	1.67	34:30	1.90	0.60
<input type="checkbox"/>	P99	1.88	06:00	1.32	34:30	1.54	0.56

APPENDIX C
Placer Ranch University Water Demand Summary

Overall Placer Ranch University Water Demands

Type	Building	Footprint (SF)	Floors	Total GSF	Beds/Stalls/ acres		Irrigation Water Estimate		PCWA				
							Irrigation acreage	Irrigation Water Demand	Land Class	WUF (afy/acre)	WUF (gpd/unit)	Domestic water demand	Total Water Demand (gpd)
Adademic	1	19447	4	77788	1.8	acres	0.63	1,808		1.25	1,116	1,993	3,801
Adademic	2	32162	4	128648	3.0	acres	1.03	2,990		1.25	1,116	3,296	6,286
Adademic	3	30956	4	123824	2.8	acres	0.99	2,878		1.25	1,116	3,172	6,050
Adademic	4	30449	5	152245	3.5	acres	1.22	3,538		1.25	1,116	3,900	7,439
Adademic	5	25995	4	103980	2.4	acres	0.84	2,416		1.25	1,116	2,664	5,080
Adademic	6	28572	5	142860	3.3	acres	1.15	3,320		1.25	1,116	3,660	6,980
Adademic	7	33990	4	135960	3.1	acres	1.09	3,160		1.25	1,116	3,483	6,643
Adademic	8	29872	5	149360	3.4	acres	1.20	3,471		1.25	1,116	3,827	7,298
Adademic	9	34984	4	139936	3.2	acres	1.12	3,252		1.25	1,116	3,585	6,837
Adademic	10	41881	4	167524	3.8	acres	1.35	3,893		1.25	1,116	4,292	8,185
Adademic	11	23469	4	93876	2.2	acres	0.75	2,182		1.25	1,116	2,405	4,587
Adademic	12	24662	4	98648	2.3	acres	0.79	2,293		1.25	1,116	2,527	4,820
Adademic	13	41327	5	206635	4.7	acres	1.66	4,802		1.25	1,116	5,294	10,096
Adademic	14	23234	4	92936	2.1	acres	0.75	2,160		1.25	1,116	2,381	4,541
Joint Development	15	37954	3	113862	2.6	acres	0.91	2,646		1.25	1,116	2,917	5,563
Joint Development	16	25534	3	76602	1.8	acres	0.62	1,780		1.25	1,116	1,963	3,743
Joint Development	17	32059	3	96177	2.2	acres	0.77	2,235		1.25	1,116	2,464	4,699
Joint Development	18	30458	3	91374	2.1	acres	0.73	2,123		1.25	1,116	2,341	4,464
Recreation Center	REC	123822	1	123822	2.8	acres	0.99	2,878		1.25	1,116	3,172	6,050
Physical Education	PE	81157	1.5	121735.5	2.8	acres	0.98	2,829		1.25	1,116	3,119	5,948
Performing Arts	PA	62471	1.5	93706.5	2.2	acres	0.75	2,178		1.25	1,116	2,401	4,578
Dining Hall 1	D1	18035	1	18035	0.4	acres	0.14	419		1.25	1,116	462	881
Dining Hall 2	D2	18722	1	18722	0.4	acres	0.15	435		1.25	1,116	480	915
Union	Union	64465	4	257860	5.9	acres	2.07	5,992		1.25	1,116	6,606	12,599
Facilities	FAC	21935	1	21935	0.5	acres	0.18	510		1.25	1,116	562	1,072
Library	LIB	106215	4	424860	9.8	acres	3.41	9,873		1.25	1,116	10,885	20,758
Campus Housing 1	H1	20952	4	83808	279	beds	0.17	487	300	0.20	179	49,941	50,428
Campus Housing 2	H2	27050	4	108200	361	beds	0.22	629	300	0.20	179	64,619	65,248
Campus Housing 3	H3	15432	5	77160	257	beds	0.12	359	300	0.20	179	46,003	46,362
Campus Housing 4	H4	15813	5	79065	264	beds	0.13	367	299	0.20	179	47,256	47,623
Campus Housing 5	H5	27364	5	136820	456	beds	0.22	636	300	0.20	179	81,624	82,260
Campus Housing 6	H6	21067	4	84268	281	beds	0.17	490	300	0.20	179	50,299	50,789
Campus Housing 7	H7	23441	4	93764	313	beds	0.19	545	300	0.20	179	56,027	56,572
Campus Housing 8	H8	19281	5	96405	321	beds	0.15	448	300	0.20	179	57,459	57,907
Campus Housing 9	H9	18235	5	91175	304	beds	0.15	424	300	0.20	179	54,416	54,840
Campus Housing 10	H10	22043	5	110215	367	beds	0.18	512	300	0.20	179	65,693	66,205
Campus Housing 11	H11	16037	5	80185	267	beds	0.13	373	300	0.20	179	47,793	48,166
Campus Housing 12	H12	14888	4	59552	199	beds	0.12	346	299	0.20	179	35,621	35,967
Campus Housing 13	H13	18135	5	90675	302	beds	0.15	421	300	0.20	179	54,058	54,479
Campus Housing 14	H14	23278	4	93112	310	beds	0.19	541	300	0.20	179	55,490	56,031
Campus Housing 15	H15	28377	5	141885	473	beds	0.23	659	300	0.20	179	84,667	85,326
Campus Housing 16	H16	17493	5	87465	292	beds	0.14	407	300	0.20	179	52,268	52,675
Staff & Faculty Housing 17	H17	29331	4	117324	78	beds	0.24	682	1,504	0.20	179	13,962	14,644
Staff & Faculty Housing 18	H18	10042	4	40168	27	beds	0.08	233	1,488	0.20	179	4,833	5,066
Staff & Faculty Housing 19	H19	9840	4	39360	26	beds	0.08	229	1,514	0.20	179	4,654	4,883
Staff & Faculty Housing 20	H20	25933	4	103732	69	beds	0.21	603	1,503	0.20	179	12,351	12,954
Parking Structure 1	PS1	104380	6	626280	1927	stalls	0.36	1,040				0	1,040
Parking Structure 2	PS2	119463	6	716778	2205	stalls	0.41	1,190				0	1,190
Parking Structure 3	PS3	167426	7	1171982	3606	stalls	0.58	1,668				0	1,668
Parking Structure 4	PS4	154810	7	1083670	3334	stalls	0.53	1,542				0	1,542
Parking Structure 5	PS5	129506	6	777036	2391	stalls	0.45	1,290				0	1,290
Parking Structure 6	PS6	90751	6	544506	1675	stalls	0.31	904				0	904
Surface Parking 1	SP1	54312	1	54312	167	stalls	0.19	541				0	541
Surface Parking 2	SP2	177650	1	177650	547	stalls	0.61	1,769				0	1,769
Surface Parking 3	SP3	79405	1	79405	244	stalls	0.27	791				0	791
Play Fields	PF	1725992	1	1725992		ft2	39.62	114,602					114,602
FTE - CSUS Placer					25000	FTE							0
Open Space Preserve					57.9	acres							0
Sierra College Bldg	A	40052	4	160208	3.7	acres	1.29	4,159		1.25	1,116	4,105	8,264
Sierra College Bldg	B	30474	4	121896	2.8	acres	0.98	2,833		1.25	1,116	3,123	5,956
FTE - Sierra College					5000.0	FTE							0
Overall Total		4322080		12326964	51482		75	217,777				1,030,113	1,247,890
Overall Total (AFY)								244.0				1,154	1,398

APPENDIX D
Placer Ranch Phasing Plan



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